

2008 ACCESSORIES & EQUIPMENT

Displays and Gages - LaCrosse

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Instrument Panel Cluster Assembly Screws	2 N.m	18 lb in
Rear Compartment Lid Ajar Switch Screws	5 N.m	44 lb in

SCHEMATIC AND ROUTING DIAGRAMS

INSTRUMENT CLUSTER SCHEMATICS

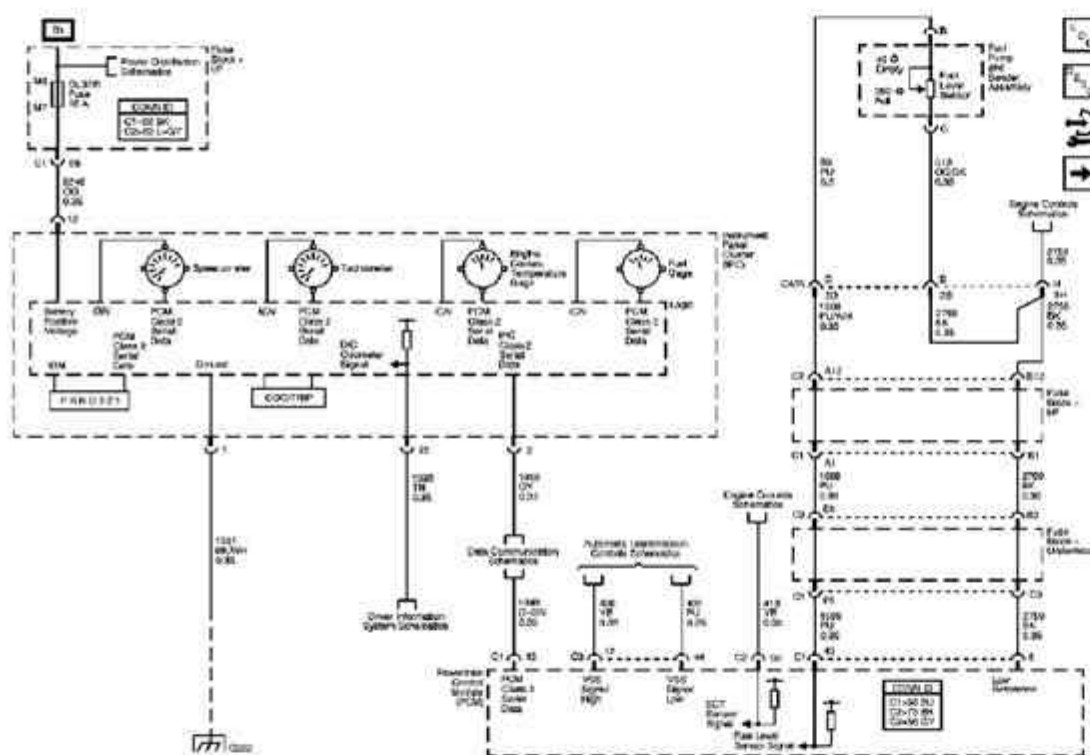


Fig. 1: Power, Ground, Serial Data, and Gages Schematic - L26
 Courtesy of GENERAL MOTORS CORP.

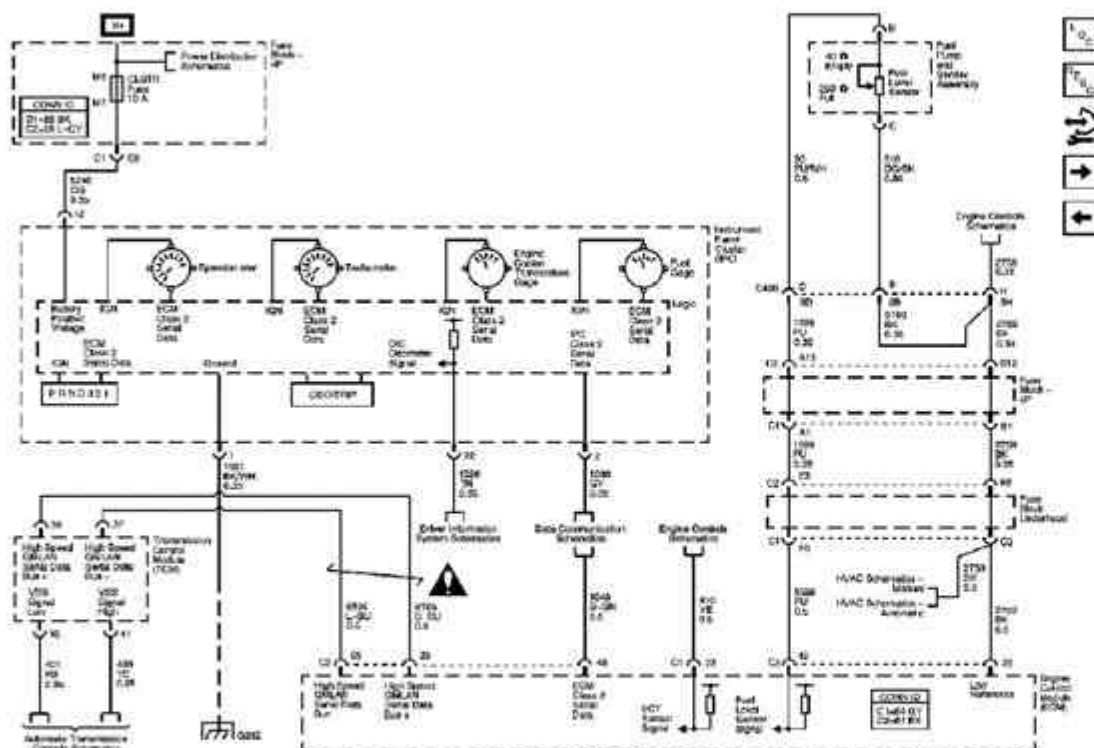


Fig. 2: Power, Ground, Serial Data, and Gages Schematic - LY7
 Courtesy of GENERAL MOTORS CORP.

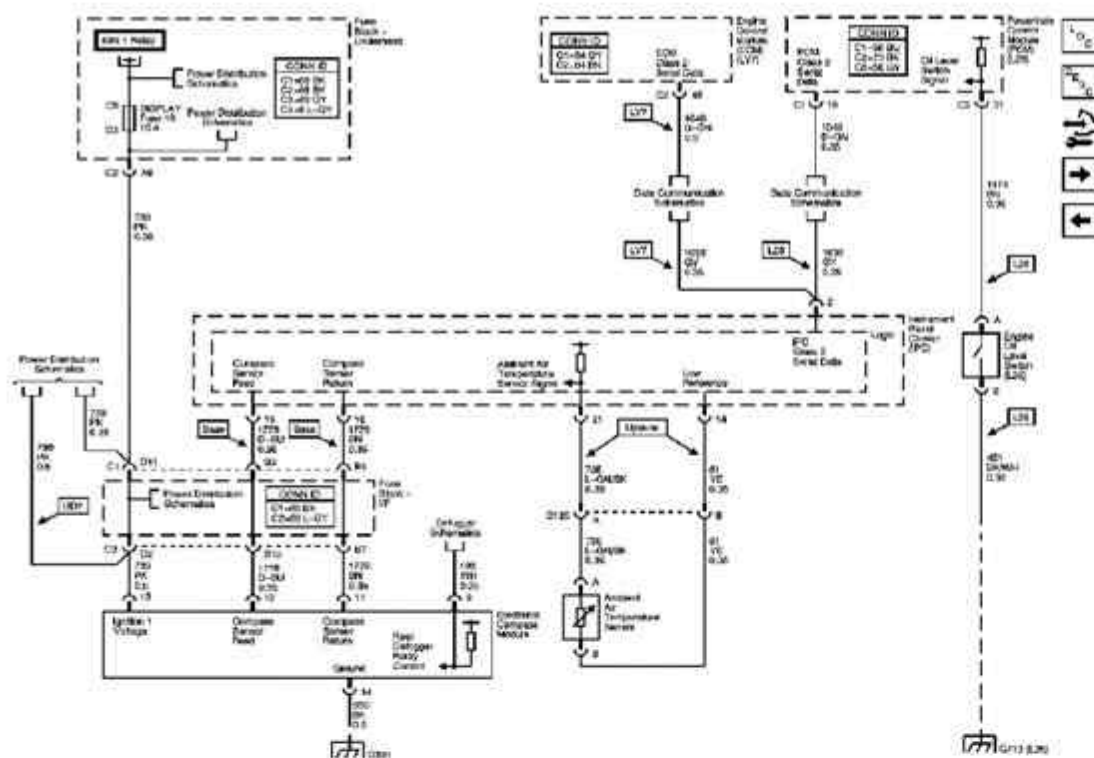


Fig. 3: Ambient Air Temperature Sensor, Electronic Compass Module & Oil Level Switch Schematic
 Courtesy of GENERAL MOTORS CORP.

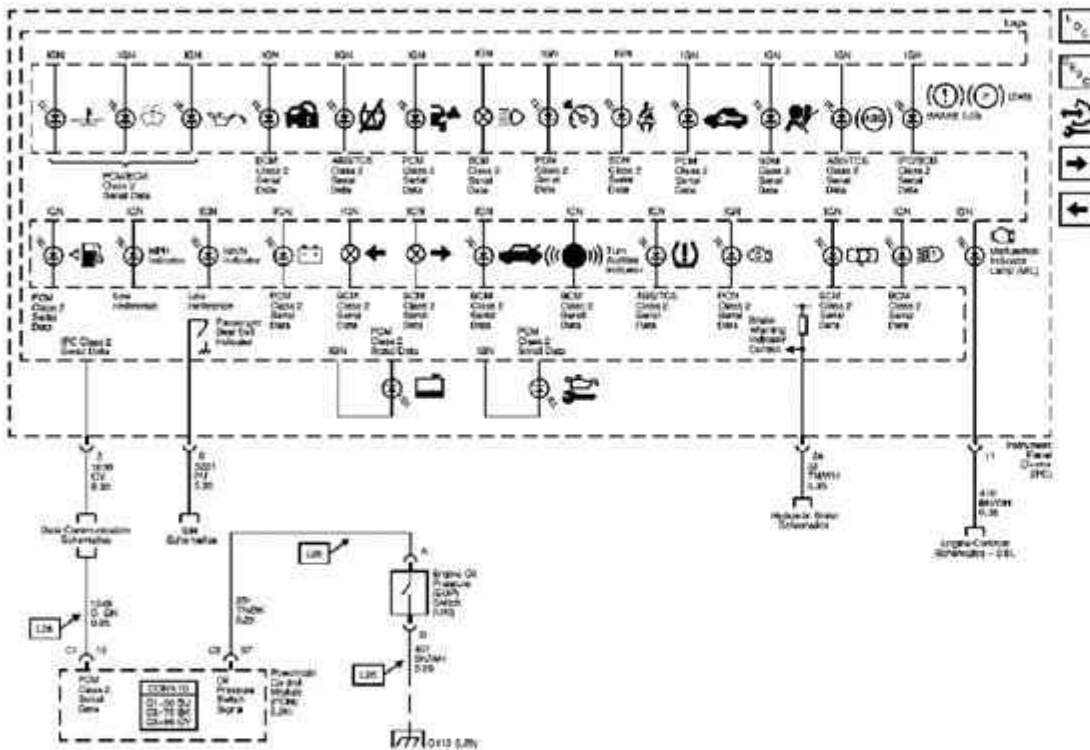


Fig. 4: Indicators Schematic - U2E
Courtesy of GENERAL MOTORS CORP.

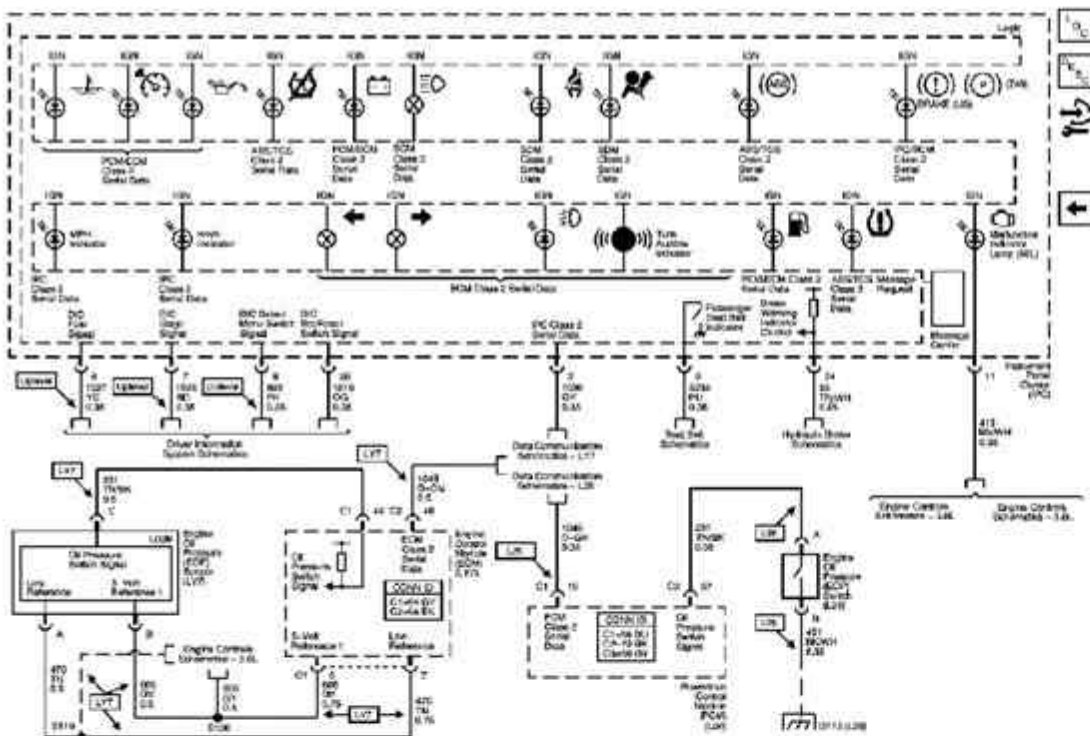


Fig. 5: Indicators Schematic - UH8
Courtesy of GENERAL MOTORS CORP.

DRIVER INFORMATION SYSTEM SCHEMATICS



Fig. 7: Audible Warnings Schematic
Courtesy of GENERAL MOTORS CORP.

DIAGNOSTIC CODE INDEX

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DTC	Description
<u>DTC B0160 or B0161</u>	B0160: Outside Air Temperature (OAT) Sensor Signal Circuit Low B0161: Outside Air Temperature Sensor Signal Circuit Open B0161 06: Outside Air Temperature Sensor Signal Circuit High
<u>DTC B0931</u>	B0931: Compass Sensor Circuit Malfunction
<u>DTC B0933</u>	B0933: Compass Sensor Circuit Low
<u>DTC B0934</u>	B0934: Compass Sensor Circuit High
<u>DTC B0935</u>	B0935: Compass Sensor Circuit Open
<u>DTC P0461</u>	P0461: Fuel Level Sensor Circuit Performance
<u>DTC P0462 (2.8L, 3.0L, 3.2L and 3.6L Engines)</u>	P0462: Fuel Level Sensor Circuit Low Voltage
<u>DTC P0462 (3.8L, 5.3L, 6.0L, 6.2L, 7.0L Engines)</u>	P0462: Fuel Level Sensor Circuit Low Voltage
<u>DTC P0463 (2.8L, 3.0L, 3.2L and 3.6L Engines)</u>	P0463: Fuel Level Sensor Circuit High Voltage
<u>DTC P0463 (3.8L, 5.3L, 6.0L, 6.2L, 7.0L Engines)</u>	P0463: Fuel Level Sensor Circuit High Voltage
<u>DTC P0520</u>	P0520: Engine Oil Pressure (EOP) Sensor Circuit
<u>DTC P0521</u>	P0521: Engine Oil Pressure (EOP) Sensor Performance
<u>DTC P0522</u>	P0522: Engine Oil Pressure (EOP) Sensor Circuit Low Voltage
<u>DTC P0523</u>	P0523: Engine Oil Pressure (EOP) Sensor Circuit High Voltage

DIAGNOSTIC STARTING POINT - DISPLAYS AND GAGES

Begin the displays and gages system diagnosis with **Diagnostic System Check - Vehicle** or the audible warning system diagnosis with **Diagnostic System Check - Vehicle**. The Diagnostic System Check will provide the following information:

- The identification of the control modules which command the system
- The ability of the control modules to communicate through the serial data circuit
- The identification of any stored diagnostic trouble codes (DTCs) and their status

The use of the Diagnostic System Check will identify the correct procedure for diagnosing the system and where the procedure is located.

DTC B0160 OR B0161**Diagnostic Instructions**

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptors**DTC B0160**

Outside Air Temperature (OAT) Sensor Signal Circuit Low

DTC B0161

Outside Air Temperature Sensor Signal Circuit Open

DTC B0161 06

Outside Air Temperature Sensor Signal Circuit High

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage
Ambient Air Temperature Sensor Signal Circuit	B0160	B0161	B0161
Ambient Air Temperature Sensor Low Reference Circuit	-	B0161	-

Circuit/System Description

The instrument panel cluster (IPC) monitors the signal circuit of the ambient air temperature sensor. The ambient air temperature sensor is a thermistor which varies in resistance as the temperature changes. As the resistance of the ambient air temperature sensor increases, the IPC senses a larger voltage drop across the sensor, indicating a lower temperature. As the resistance of the ambient air temperature sensor decreases, the IPC senses a smaller voltage drop across the sensor, indicating a higher temperature. The ambient air temperature is displayed in the DIC by the IPC. The ambient air temperature sensor is interfaced with the IPC via the ambient air temperature signal circuit and the low reference circuit.

Conditions for Running the DTC

The IPC must be fully operational within a continuous voltage supply of 9-16 volts.

Conditions for Setting the DTC**B0160**

Sets when the instrument panel cluster (IPC) detects that the ambient air temperature is greater than 190°F (88°C) for more than 2 seconds.

B0161

Sets when the IPC detects that the ambient air temperature is less than -40°F (-40°C) for more than 2 seconds.

Action Taken When the DTC Sets

- "SC" is displayed in the DIC by the IPC when the ambient air temperature sensor resistance value is less than the lowest ambient air temperature sensor resistance threshold and DTC B0160 is present.
- "OC" is displayed in the DIC by the IPC when the ambient air temperature sensor resistance value is greater than the highest ambient air temperature sensor resistance threshold and DTC B0161 is present.

Conditions for Clearing the DTC

- The DTC becomes history when the DIC no longer detects a failure.
- The history DTC clears after 100 fault-free ignition cycles.

Reference Information**Schematic Reference****Instrument Cluster Schematics****Connector End View Reference**

Component Connector End Views

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the ambient air temperature sensor.
2. Ignition OFF, test for less than 1 ohm of resistance between the low reference circuit terminal B and ground.
 - o If greater than the specified value, test the low reference circuit terminal B for an open/high resistance.
3. Ignition ON, verify the driver information center (DIC) displays "OC".
 - o If the DIC does not display "OC", test the signal circuit terminal A for a short to ground. If the circuit tests normal, replace the DIC.
4. Ignition ON, install a 3A fused jumper wire between the signal circuit terminal A and the low reference circuit terminal B. Verify the DIC displays "SC".
 - o If the DIC does not display "SC", test the signal circuit terminal A for a short to voltage or an open/high resistance. If the circuit tests normal, replace the DIC.
5. If all circuits test normal, test or replace the ambient air temperature sensor.

Repair Procedures

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Ambient Air Temperature Gage Sensor Replacement
- Control Module References for the IPC replacement, programming and setups

DTC B0931

Diagnostic Instructions

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DTC Descriptor

DTC B0931

Compass Sensor Circuit Malfunction

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition 1 Voltage Circuit	-	B0935	-	B0931

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Compass Sensor Feed	B0933	B0935	B0934	B0931
Compass Sensor Return	B0933	B0935	B0934	B0931
Compass Ground Circuit	-	B0935	-	B0931

Circuit/System Description

The internal fault detection of the electronic compass module is handled by the instrument panel cluster (IPC). The compass information is sent to the IPC via 2 discreet inputs from the electronic compass module. The IPC displays compass information in the driver information center (DIC). The DIC displays 2 dashes (- -) when the IPC loses connection with the electronic compass module.

Conditions for Running the DTC

The IPC monitors the analog input value at power up.

Conditions for Setting the DTC

When communication with the compass module exists but the IPC does not detect valid data from the electronic compass module or the compass error flag is set.

Action Taken When the DTC Sets

The DTC will be set and stored in non-volatile memory.

Conditions for Clearing the DTC

- The DTC becomes history when the IPC no longer detects a failure.
- The history DTC clears after 100 fault-free ignition cycles.

Reference Information

Schematic Reference

- [Driver Information System Schematics](#)
- [Instrument Cluster Schematics](#)

Connector End View Reference

Component Connector End Views

Description and Operation

Driver Information Center (DIC) Description and Operation

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Verification

1. Verify that DTC B0931 is not set.

- o If the DTC is set, calibrate the electronic compass module. If the DTC resets, replace the electronic compass module.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Electronic Compass Calibration**
- **Control Module References** for the electronic compass module replacement, setup and programming

DTC B0933

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC B0933

Compass Sensor Circuit Low

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition 1 Voltage Circuit	-	B0935	-	B0931
Compass Sensor Feed	B0933	B0935	B0934	B0931
Compass Sensor Return	B0933	B0935	B0934	B0931
Compass Ground Circuit	-	B0935	-	B0931

Circuit Description

The internal fault detection of the electronic compass module is handled by the instrument panel cluster (IPC). The compass information is sent to the IPC via 2 discrete wire inputs from the electronic compass module. The IPC displays compass information in the driver information center (DIC).

Conditions for Running the DTC

The instrument panel cluster (IPC) monitors the analog input values at power up.

Conditions for Setting the DTC

The IPC detects that either compass input circuit(s) is shorted to ground.

Action Taken When the DTC Sets

The DTC will be set and stored in non-volatile memory.

Conditions for Clearing the DTC

- The DTC will become history when a power cycle has been performed and the fault is not detected by the IPC.

- The history DTC clears after 100 fault-free ignition cycles.

Reference Information**Schematic Reference**

- **Instrument Cluster Schematics**
- **Driver Information System Schematics**

Connector End View Reference**Component Connector End Views****Description and Operation****Driver Information Center (DIC) Description and Operation****Electrical Information Reference**

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference**Control Module References** for Scan Tool Information**Circuit/System Testing**

1. Ignition OFF, disconnect the harness connector at the electronic compass module.
2. Ignition OFF, test for less than 1.0 ohm of resistance between the ground circuit terminal 14 and ground.
 - If greater than the specified value, test the ground circuit for an open/high resistance.
3. Ignition ON, verify that a test lamp illuminates when connected between the ignition 1 voltage circuit terminal 13 and ground circuit terminal 14.
 - If the test lamp does not illuminate, test the ignition 1 voltage circuit for a short to ground or an open/high resistance.
4. Ignition ON, verify a test lamp does not illuminate when connected between the compass sensor feed terminal 12 and the ignition 1 voltage circuit terminal 13.
 - If the test lamp illuminates, test the compass sensor feed terminal 12 for short to ground.
5. Ignition ON, verify a test lamp does not illuminate when connected between the compass sensor return terminal 11 and the ignition 1 voltage circuit terminal 13.
 - If the test lamp illuminates, test the compass sensor return terminal 11 for a short to ground.
6. If all circuits test normal, test or replace the electronic compass module.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Electronic Compass Calibration**
- **Control Module References** for the electronic compass module replacement, setup and programming

DTC B0934**Diagnostic Instructions**

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor**DTC B0934**

Compass Sensor Circuit High

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition 1 Voltage Circuit	-	B0935	-	B0931
Compass Sensor Feed	B0933	B0935	B0934	B0931
Compass Sensor Return	B0933	B0935	B0934	B0931
Compass Ground Circuit	-	B0935	-	B0931

Circuit Description

The internal fault detection of the electronic compass module is handled by the instrument panel cluster (IPC). The compass information is sent to the IPC via 2 discrete wire inputs from the electronic compass module. The IPC displays compass information in the driver information center (DIC).

Conditions for Running the DTC

The instrument panel cluster (IPC) monitors the analog input value once every ignition cycle at power up.

Conditions for Setting the DTC

The IPC detects that either compass input circuit(s) is shorted to battery.

Action Taken When the DTC Sets

The DTC will be set and stored in non-volatile memory.

Conditions for Clearing the DTC

- The DTC will become history when a power cycle has been performed and the fault is not detected by the IPC.
- A history DTC will clear after 100 fault-free ignition cycles.

Reference Information**Schematic Reference**

- **Driver Information System Schematics**
- **Instrument Cluster Schematics**

Connector End View Reference

Component Connector End Views

Description and Operation

Driver Information Center (DIC) Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the electronic compass module.
2. Ignition OFF, test for less than 1.0 ohm of resistance between the ground circuit terminal 14 and ground.
 - If greater than the specified value, test the ground circuit for an open/high resistance.
3. Ignition ON, verify that a test lamp does not illuminate when connected between the compass sensor feed terminal 12 and the ground circuit terminal 14.
 - If the test lamp illuminates, test the compass sensor feed terminal 12 for a short to voltage.
4. Ignition ON, verify that a test lamp does not illuminate when connected between the compass sensor return terminal 11 and the ground circuit terminal 14.
 - If the test lamp illuminates, test the compass sensor return terminal 11 for a short to voltage.
5. If all circuits test normal, test or replace the electronic compass module.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Electronic Compass Calibration**
- **Control Module References** for the electronic compass module replacement, setup and programming

DTC B0935

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC B0935

Compass Sensor Circuit Open

Diagnostic Fault Information

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Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition 1 Voltage Circuit	-	B0935	-	B0931
Compass Sensor Feed	B0933	B0935	B0934	B0931
Compass Sensor Return	B0933	B0935	B0934	B0931
Compass Ground Circuit	-	B0935	-	B0931

Circuit Description

The internal fault detection of the electronic compass module is handled by the instrument panel cluster (IPC). The compass information is sent to the IPC via 2 discrete inputs from the electronic compass module. The IPC displays compass information in the driver information center (DIC). The compass connection failure occurs when the electronic compass module is disconnected or the sensor circuit(s) is open.

Conditions for Running the DTC

The instrument panel cluster (IPC) monitors the analog input value once every ignition cycle at power up.

Conditions for Setting the DTC

The IPC detects that the electronic compass module is not connected or the electronic compass sensor circuits are open.

Action Taken When the DTC Sets

The DTC will be set and stored in non-volatile memory.

Conditions for Clearing the DTC

- The DTC will become history when a power cycle has been performed and the fault is not detected by the IPC.
- A history DTC will clear after 100 fault-free ignition cycles.

Reference Information

Schematic Reference

- [Driver Information System Schematics](#)
- [Instrument Cluster Schematics](#)

Connector End View Reference

Component Connector End Views

Description and Operation

Driver Information Center (DIC) Description and Operation

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the electronic compass module.
2. Ignition OFF, test for less than 1.0 ohm of resistance between the ground circuit terminal 14 and ground.
 - o If greater than the specified value, test the ground circuit terminal 14 for an open/high resistance.
3. Ignition ON, verify that a test lamp illuminates when connected between the ignition 1 voltage circuit terminal 13 and the ground circuit terminal 14.
 - o If the test lamp does not illuminate, test the ignition 1 voltage circuit terminal 13 for a short to ground or an open/high resistance.
4. Ignition OFF, disconnect the harness connector at the IPC.
5. Ignition OFF, test for less than 1 ohm of resistance between the compass sensor feed terminal 12 and 19.
 - o If greater than the specified value, test the compass sensor feed for an open/high resistance.
6. Ignition OFF, test for less than 1 ohm of resistance between the compass sensor return terminal 11 and 18.
 - o If greater than the specified value, test the compass sensor feed for an open/high resistance.
7. If all circuits test normal, test or replace the electronic compass module.

Repair Procedures

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

- Electronic Compass Calibration
- Control Module References for the electronic compass module replacement, setup and programming

DTC P0461

Diagnostic Instructions

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DTC Descriptor

DTC P0461

Fuel Level Sensor Circuit Performance

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Fuel Level Sensor Reference Voltage Circuit	P0462	-	-	P0461
Fuel Level Sensor Signal Circuit	P0462	P0463	P0463	P0461
Fuel Level Sensor Low Reference Circuit	-	P0463	P0463	P0461

Circuit/System Description

The fuel level sensor changes resistance in response to the fuel level. The engine control module (ECM) monitors the signal circuit of the fuel level sensor in order to determine the fuel level. When the fuel tank is full, the sensor resistance is low and the ECM senses a low signal voltage. When the fuel tank is empty, the sensor resistance is high and the ECM senses a high signal voltage. The ECM uses the signal circuit of the fuel level sensor in order to calculate the percentage of fuel remaining in the tank. The ECM sends the fuel level percentage via serial data circuit to the instrument panel cluster (IPC). The ECM sends a serial data message to the IPC in order to display the fuel level in the fuel gage.

Conditions for Running the DTC

- The engine is running.
- No other fuel level sensor signal failure is present
- Fuel level state is stable

Conditions for Setting the DTC

- The ECM detects a difference between the engine consumed fuel and change of the fuel level signal of less than 1L (0.264 gallons) over a range of 30L (7.92 gallons) or 45 .6 percent of the fuel tank.
- The above condition is present for greater than 300 seconds.

Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The low fuel indicator displays in the IPC.
- The ECM records the operating conditions at the time that the diagnostic test fails. The ECM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction-free warm-up cycles.

Reference Information**Schematic Reference**

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 2.8L, 3.0L, 3.2L and 3.6L engines
- **Engine Controls Schematics** for the 3.8L engine
- **Engine Controls Schematics** for the 4.8L, 5.3L, 6.0L, 6.2L, and 7.0L engines

Connector End View Reference**Component Connector End Views****Description and Operation**

- **Fuel System Description** for the 2.8L, 3.0L, 3.2L and 3.6L engines
- **Fuel System Description** for the 3.8L engine

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**

- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Testing

1. Ignition OFF, remove the fuel level sender and verify there are no objects interfering with the fuel level sender.
 - o Repair any fuel level sender interference.
2. If all circuits test normal, perform the fuel level sensor component test before replacing the fuel level sensor.

Component Testing

1. Ignition OFF, disconnect the harness connector at the fuel level sensor.
2. While sweeping the fuel level sensor through its full range of motion, test for a minimum value less than 41 ohms and a maximum value greater than 119 ohms of resistance between signal terminal B and the low reference terminal C.
 - o If not within the specified range, replace the fuel level sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Fuel Level Sensor Replacement** for the 2.8L, 3.0L, 3.2L and 3.6L engines
- **Fuel Level Sensor Replacement** for the 3.8L engine
- **Fuel Level Sensor Replacement** for the 4.8L, 5.3L, 6.0L, 6.2L, and 7.0L engines
- **Control Module References** for ECM replacement, setup, and programming

DTC P0462 (2.8L, 3.0L, 3.2L AND 3.6L ENGINES)

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P0462

Fuel Level Sensor Circuit Low Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Fuel Level Sensor Reference Voltage Circuit	P0462	-	-	P0461
Fuel Level Sensor Signal Circuit	P0462	P0463	P0463	P0461
Fuel Level Sensor Low Reference	-	P0463	P0463	P0461

Circuit				
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Circuit/System Description

The fuel level sensor changes resistance in response to the fuel level. The engine control module (ECM) monitors the signal circuit of the fuel level sensor in order to determine the fuel level. When the fuel tank is full, the sensor resistance is low and the ECM senses a low signal voltage. When the fuel tank is empty, the sensor resistance is high and the ECM senses a high signal voltage. The ECM uses the signal circuit of the fuel level sensor in order to calculate the percentage of fuel remaining in the tank. The ECM sends the fuel level percentage via the serial data circuit to the ECM. The ECM sends serial data messages to the instrument panel cluster (IPC) in order to display the fuel level in the fuel gage.

Conditions for Running the DTC

- The ignition is ON, with the engine running.
- The system voltage is between 10-18 volts.

Conditions for Setting the DTC

- The sender output is less than 0.5 volt.
- The above condition is present for greater than 60 seconds.

Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The low fuel indicator displays in the IPC.
- The ECM records the operating conditions at the time that the diagnostic test fails. The ECM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction-free warm-up cycles.
- The ECM receives a clear code command from the scan tool.

Reference Information**Schematic Reference**

- [Instrument Cluster Schematics](#)
- [Engine Controls Schematics](#)

Connector End View Reference**Component Connector End Views****Description and Operation**

- [Instrument Cluster Description and Operation](#)
- [Fuel System Description](#)

Electrical Information Reference

- [Circuit Testing](#)

- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Verification

With the scan tool installed and the ignition ON, the Fuel Level parameter in the ECM EVAP Data List should indicate a value at or greater than 98 percent.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the fuel level sensor.
2. Ignition ON, the scan tool installed, verify the Fuel Level parameter is 4 percent or less.
 - o If the Fuel Level parameter indicates a value greater than 4 percent, test the fuel level sensor signal circuit terminal B for a short to ground. If the fuel level sensor circuit tests normal, replace the ECM.
3. If all circuits test normal, perform the fuel level sensor component test before replacing the fuel level sensor.

Component Testing

1. Ignition OFF, disconnect the harness connector at the fuel level sensor.
2. While sweeping the fuel level sensor through its full range of motion, test for a minimum value less than 41 ohms and a maximum value greater than 119 ohms of resistance between signal terminal B and the low reference terminal C.
 - o If not within the specified range, replace the fuel level sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Fuel Level Sensor Replacement**
- **Control Module References** for the ECM replacement, setup, and programming

DTC P0462 (3.8L, 5.3L, 6.0L, 6.2L, 7.0L ENGINES)

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P0462

Fuel Level Sensor Circuit Low Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance

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Fuel Level Sensor Reference Voltage Circuit	P0462	-	-	P0461
Fuel Level Sensor Signal Circuit	P0462	P0463	P0463	P0461
Fuel Level Sensor Low Reference Circuit	-	P0463	P0463	P0461

Circuit/System Description

The fuel level sensor changes resistance in response to the fuel level. The powertrain control module (PCM) monitors the signal circuit of the fuel level sensor in order to determine the fuel level. When the fuel tank is full, the sensor resistance is low and the PCM senses a low signal voltage. When the fuel tank is empty, the sensor resistance is high and the PCM senses a high signal voltage. The PCM uses the signal circuit of the fuel level sensor in order to calculate the percentage of fuel remaining in the tank. The PCM sends the fuel level percentage via serial data circuit to the instrument panel cluster (IPC). The PCM sends a serial data message to the IPC in order to display the fuel level in the fuel gage.

Conditions for Running the DTC

- The ignition is ON, with the engine running.
- The system voltage is between 10-18 volts.

Conditions for Setting the DTC

- The sender output is less than 0.5 volt.
- The total resistance of the circuit is about or below 27.3 ohms.
- The fuel level signal is 0 percent.
- The above condition is present for greater than 10 seconds.

Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The low fuel indicator displays in the IPC.
- The PCM records the operating conditions at the time that the diagnostic test fails. The PCM displays the failure information in the Failure Records on the scan tool

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction-free warm-up cycles.

Reference Information**Schematic Reference**

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 3.8L engine
- **Engine Controls Schematics** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines

Connector End View Reference**Component Connector End Views****Description and Operation**

- **Instrument Cluster Description and Operation**
- **Fuel System Description** for the 3.8L engine

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Verification

With the scan tool installed and the ignition ON, the Fuel Tank Level Remaining parameter in the PCM EVAP Data List should indicate a value at or greater than 98 percent.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the fuel level sensor.
2. Ignition ON, the scan tool installed, verify the Fuel Tank Level remaining parameter is 4 percent or less.
 - If the Fuel Tank Level Remaining parameter indicates a value greater than 4 percent, test the fuel level sensor signal circuit terminal B for a short to ground. If the fuel level sensor circuit tests normal, replace the PCM.
3. If all circuits test normal, perform the fuel level sensor component test before replacing the fuel level sensor.

Component Testing

1. Ignition OFF, disconnect the harness connector at the fuel level sensor.
2. While sweeping the fuel level sensor through its full range of motion, test for a minimum value less than 41 ohms and a maximum value greater than 119 ohms of resistance between signal terminal B and the low reference terminal C.
 - If not within the specified range, replace the fuel level sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Fuel Level Sensor Replacement** for the 3.8L engine
- **Fuel Level Sensor Replacement** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines
- **Control Module References** for the PCM replacement, setup, and programming

DTC P0463 (2.8L, 3.0L, 3.2L AND 3.6L ENGINES)

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P0463

Fuel Level Sensor Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Fuel Level Sensor Reference Voltage Circuit	P0462	-	-	P0461
Fuel Level Sensor Signal Circuit	P0462	P0463	P0463	P0461
Fuel Level Sensor Low Reference Circuit	-	P0463	P0463	P0461

Circuit/System Description

The fuel level sensor changes resistance in response to the fuel level. The engine control module (ECM) monitors the signal circuit of the fuel level sensor in order to determine the fuel level. When the fuel tank is full, the sensor resistance is high and the ECM senses a high signal voltage. When the fuel tank is empty, the sensor resistance is low and the ECM senses a low signal voltage. The ECM uses the signal circuit of the fuel level sensor in order to calculate the percentage of remaining fuel in the tank. The ECM sends the fuel level percentage via serial data circuit to the instrument panel cluster (IPC). The ECM sends a serial data message to the IPC in order to display the fuel level percent on the fuel gage.

Conditions for Running the DTC

- The ignition is ON, with the engine running.
- The system voltage is between 10-18 volts.

Conditions for Setting the DTC

- The fuel level signal is above 2.5 volts.
- The above condition is present for about 60 seconds.

Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The low fuel indicator displays in the IPC.
- The ECM records the operating conditions at the time that the diagnostic test fails. The ECM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction-free warm-up cycles.

Reference Information**Schematic Reference**

- [Instrument Cluster Schematics](#)
- [Engine Controls Schematics](#)

Connector End View Reference

Component Connector End Views

Description and Operation

- **Instrument Cluster Description and Operation**
- **Fuel System Description**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Verification

With the scan tool installed and the ignition ON, the Fuel Level parameter in the ECM EVAP Data List indicates a value at or greater than 4 percent.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the fuel level sensor.
2. Ignition OFF, test for less than 1 ohm of resistance between the fuel level sensor low reference circuit terminal C and ground.
 - If greater than the specified range, test the low reference circuit terminal C for a short to voltage or an open/high resistance. If the circuits tests normal, replace the ECM.
3. Install a 3A fused jumper wire between the fuel level sensor signal circuit terminal B and the fuel level sensor low reference circuit terminal C. Verify the Fuel Level parameter is greater than 98 percent.
 - If less than 98 percent, test the fuel level sensor signal circuit terminal B and low reference circuit terminal C for a short to voltage or an open/high resistance. If the circuit tests normal, replace the ECM.
4. If all circuits test normal, perform the fuel level sensor component test before replacing either the primary or secondary fuel level sensor.

Component Testing

1. Ignition OFF, disconnect the harness connector at the fuel level sensor.
2. While sweeping the fuel level sensor through its full range of motion, test for a minimum value less than 41 ohms and a maximum value greater than 119 ohms of resistance between signal terminal B and the low reference terminal C.
 - If not within the specified range, replace the fuel level sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Fuel Level Sensor Replacement**
- **Control Module References** for the ECM replacement, setup, and programming

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor**DTC P0463**

Fuel Level Sensor Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Fuel Level Sensor Reference Voltage Circuit	P0462	-	-	P0461
Fuel Level Sensor Signal Circuit	P0462	P0463	P0463	P0461
Fuel Level Sensor Low Reference Circuit	-	P0463	P0463	P0461

Circuit/System Description

The fuel level sensor changes resistance in response to the fuel level. The powertrain control module (PCM) monitors the signal circuit of the fuel level sensor in order to determine the fuel level. When the fuel tank is full, the sensor resistance is low and the PCM senses a low signal voltage. When the fuel tank is empty, the sensor resistance is high and the PCM senses a high signal voltage. The PCM uses the signal circuit of the fuel level sensor in order to calculate the percentage of fuel remaining in the tank. The PCM sends the fuel level percentage via serial data circuit to the instrument panel cluster (IPC). The PCM sends a serial data message to the IPC in order to display the fuel level in the fuel gage.

Conditions for Running the DTC

- The ignition is ON, with the engine running.
- The system voltage is between 10-18 volts.

Conditions for Setting the DTC

- The fuel level signal is above 2.5 volts.
- The fuel level signal is greater than 100 percent.
- The above condition is present for greater than 10 seconds.

Action Taken When the DTC Sets

- The fuel gage defaults to empty.
- The low fuel indicator displays in the IPC.
- The PCM records the operating conditions at the time that the diagnostic test fails. The PCM displays the failure information in the Failure Records on the scan tool.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction-free warm-up cycles.

Reference Information**Schematic Reference**

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 3.8L engine
- **Engine Controls Schematics** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines

Connector End View Reference**Component Connector End Views****Description and Operation**

- **Instrument Cluster Description and Operation**
- **Fuel System Description** for the 3.8L engine

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference**Control Module References** for Scan Tool Information**Circuit/System Verification**

With the scan tool installed and the ignition ON, the Fuel Tank Level Remaining parameter in the PCM EVAP Data List indicates a value at or greater than 4 percent

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the fuel level sensor.
2. Ignition OFF, test for less than 1 ohm of resistance between the fuel level sensor low reference circuit terminal C and ground.
 - If greater than the specified range, test the low reference circuit terminal C for a short to voltage or an open/high resistance. If the circuit tests normal, replace the PCM.
3. Install a 3A fused jumper wire between the fuel level sensor signal circuit terminal B and the fuel level sensor low reference circuit terminal C. Verify the Fuel Tank Level Remaining parameter is greater than 98 percent.
 - If less than 98 percent, test the fuel level sensor signal terminal B and low reference circuit terminal C for a short to voltage or an open/high resistance. If the circuits test normal, replace the PCM.
4. If all circuits test normal, perform the fuel level sensor component test before replacing either the primary or secondary fuel level sensor.

Component Testing

1. Ignition OFF, disconnect the harness connector at the fuel level sensor.
2. While sweeping the fuel level sensor through its full range of motion, test for a minimum value less than 41 ohms and a maximum value greater than 119 ohms of resistance between signal terminal B and the low reference terminal C.

- If not within the specified range, replace the fuel level sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Fuel Level Sensor Replacement** for the 3.8L engine
- **Fuel Level Sensor Replacement** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines
- **Control Module References** for the PCM replacement, setup, and programming

DTC P0520

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P0520

Engine Oil Pressure (EOP) Sensor Circuit

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Engine Oil Pressure Sensor Signal Circuit	-	P0520	P0520	-
Engine Oil Pressure Sensor Ground Circuit	-	P0520	-	-

Circuit/System Description

The engine oil pressure (EOP) switch is a normally closed switch that opens with the proper oil pressure. With the ignition switch turned ON and the engine not running, the powertrain control module (PCM) should detect a low signal voltage input. With the engine running, the oil pressure switch opens and the PCM detects a high signal voltage input. The PCM tests the state of the EOP signal circuit with the ignition switch turned ON, and the engine turned OFF. When the oil pressure is low, the PCM sends a serial data message to the instrument panel cluster (IPC) requesting the EOP indicator turned ON. The IPC illuminates the EOP indicator when the IPC receives a serial data message from the PCM requesting the EOP indicator turned ON.

Conditions for Running the DTC

- The ignition is ON, with the engine ON.
- Engine temperature is 10°C (50°F) less than the last key off temperature.

Conditions for Setting the DTC

- The PCM detects that the EOP switch signal circuit is pulled high.
- The above condition is present for greater than 10 seconds.

Action Taken When the DTC Sets

- The PCM records the operating conditions at the time the diagnostic test fails. The PCM displays this information in the Failure Records on the scan tool.
- The IPC displays the engine oil pressure indicator.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction-free warm-up cycles.

Reference Information**Schematic Reference**

- Instrument Cluster Schematics
- Engine Controls Schematics

Connector End View Reference**Component Connector End Views****Description and Operation****Instrument Cluster Description and Operation****Electrical Information Reference**

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference**Control Module References for Scan Tool Information****Circuit/System Testing**

IMPORTANT: Do not turn the key to the crank position or engage the starter at any time during diagnosis.

1. Ignition OFF, disconnect the harness connector at the EOP switch.
2. Ignition OFF, test for less than 1 ohm of resistance between the ground circuit terminal B and ground.
 - If greater than the specified value, test the ground circuit terminal B for an open/high resistance.
3. Ignition ON, install a 3A fused jumper wire between the signal circuit terminal A and the ground circuit terminal B. Verify the scan tool Engine Oil Pressure Switch parameter is Low.
 - If not Low, test the signal circuit terminal A for a short to voltage or an open/high resistance. If the circuit tests normal, replace the PCM.
4. If all circuits test normal, replace the engine oil pressure switch.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Engine Oil Pressure Sensor and/or Switch Replacement**
- **Control Module References** for the PCM replacement, setup, and programming

DTC P0521**Diagnostic Instructions**

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor**DTC P0521**

Engine Oil Pressure (EOP) Sensor Performance

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Engine Oil Pressure 5-Volt Reference Circuit	P0522	P0522	-	P0521
Engine Oil Pressure Sensor Signal Circuit	P0522	P0522	P0523	P0521
Low Reference	-	P0523	-	P0521

Circuit/System Description

The engine oil pressure (EOP) sensor changes voltage based on the engine oil pressure. The EOP sensor is a 3-wire sensor comprising of the signal circuit, the low reference circuit and the 5-volt reference circuit. The engine control module (ECM) supplies 5 volts to the EOP sensor via the 5-volt reference circuit and provides ground via the EOP low reference circuit. The ECM monitors the signal circuit of the EOP sensor to determine if the engine oil pressure sensor voltage is within the normal operating range of approximately 1-4 volts. When the engine oil pressure is high, the EOP sensor voltage is high and the ECM senses a high signal voltage. When the engine oil pressure is low, the EOP sensor voltage is low and the ECM senses a low signal voltage. The ECM sends the EOP information to the instrument panel cluster (IPC) via the serial data circuit.

Conditions for Running the DTC

- The engine is idling at less than 640 RPM and the engine oil pressure sensor performance check is high.
- The engine is running at greater than 1520 RPM and the engine oil pressure sensor performance check is low.

Conditions for Setting the DTC

- The engine oil pressure is greater than 880 kPa (127.6 psi).
- The engine oil pressure is less than 8 kPa (1.16 psi).

Action Taken When the DTC Sets

- The ECM records the operating conditions at the time the diagnostics test fails. The ECM displays this information in the Failure Records on the scan tool.
- The IPC illuminates the EOP indicator.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction-free warm-up cycles.

Reference Information**Schematic Reference**

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 2.8L, 3.0L, 3.2L, and 3.6L engines
- **Engine Controls Schematics** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines

Connector End View Reference**Component Connector End Views****Description and Operation**

- **Instrument Cluster Description and Operation**
- **Engine Control Module Description** for the 2.8L, 3.0L, 3.2L, and 3.6L engines
- **Engine Control Module Description** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference**Control Module References** for Scan Tool Information**Circuit/System Verification**

With the scan tool installed and the engine idling, the Engine Oil Pressure Sensor parameter should indicate a range of 8 kPa (1.16 psi) - 880 kPa (127.6 psi).

Circuit/System Testing

Ignition ON and the engine idling, verify the scan tool Engine Oil Pressure Sensor parameter is within 8 kPa (1.16 psi) - 550 kPa (80 psi).

- If not within the range of 8 kPa (1.16 psi) - 550 kPa (80 psi), replace the EOP sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Engine Oil Pressure Sensor and/or Switch Replacement** for the 2.8L, 3.0L, 3.2L, and 3.6L engines
- **Engine Oil Pressure Sensor and/or Switch Replacement** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines

DTC P0522**Diagnostic Instructions**

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor**DTC P0522**

Engine Oil Pressure (EOP) Sensor Circuit Low Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Engine Oil Pressure 5-Volt Reference Circuit	P0522	P0522	-	P0521
Engine Oil Pressure Sensor Signal Circuit	P0522	P0522	P0523	P0521
Low Reference	-	P0523	-	P0521

Circuit/System Description

The engine oil pressure (EOP) sensor changes voltage based on the engine oil pressure. The EOP sensor is a 3-wire sensor comprising of the signal circuit, the low reference circuit and the 5-volt reference circuit. The engine control module (ECM) supplies 5-volts to the EOP sensor via the 5-volt reference circuit and provides ground via the EOP low reference circuit. The ECM monitors the signal circuit of the EOP sensor to determine the engine oil pressure sensor voltage is within the normal operating range of approximately 1-4 volts. When the engine oil pressure is high, the EOP sensor voltage is high and the ECM senses a high signal voltage. When the engine oil pressure is low, the EOP sensor voltage is low and the ECM senses a low signal voltage. The ECM sends the EOP information to the instrument panel cluster (IPC) via the serial data circuit.

Conditions for Running the DTC

The engine is running.

Conditions for Setting the DTC

- The ECM detects that the EOP sensor signal circuit is less than 0.195 volt.
- The above condition is present for greater than 10 seconds.

Action Taken When the DTC Sets

- The ECM records the operating conditions at the time the diagnostics test fails. The ECM displays this information in the Failure Records on the scan tool.
- The IPC illuminates the EOP indicator.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction-free warm-up cycles.

Reference Information**Schematic Reference**

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 2.8L, 3.0L, 3.2L, and 3.6L engines
- **Engine Controls Schematics** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines

Connector End View Reference

Component Connector End Views

Description and Operation

- **Instrument Cluster Description and Operation**
- **Engine Control Module Description** for the 2.8L, 3.0L, 3.2L, and 3.6L engines
- **Engine Control Module Description** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the engine oil pressure (EOP) sensor.
2. Ignition ON, test for 4.8-5.2 volts between the 5-volt reference circuit terminal B and ground.
 - o If less than the specified range, test the 5-volt reference circuit terminal B for a short to ground or an open/high resistance. If the circuit tests normal, replace the engine control module (ECM).
3. Install a 3-amp fused jumper wire between the signal circuit terminal C and the 5-volt reference circuit terminal B. Verify the scan tool Engine Oil Pressure Sensor parameter is greater than 550 kPa (80 psi).
 - o If less than the specified range, test the signal circuit terminal C for a short to ground or an open/high resistance. If the circuit tests normal, replace the ECM.
4. If all circuits test normal, test or replace the EOP sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Engine Oil Pressure Sensor and/or Switch Replacement** for the 2.8L, 3.0L, 3.2L, and 3.6L engines
- **Engine Oil Pressure Sensor and/or Switch Replacement** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines
- **Control Module References** for ECM replacement, setup and programming

DTC P0523

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.

- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P0523

Engine Oil Pressure (EOP) Sensor Circuit High Voltage

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Engine Oil Pressure 5-Volt Reference Circuit	P0522	P0522	-	P0521
Engine Oil Pressure Sensor Signal Circuit	P0522	P0522	P0523	P0521
Low Reference	-	P0523	-	P0521

Circuit/System Description

The engine oil pressure (EOP) sensor changes voltage based on the engine oil pressure. The EOP sensor is a 3-wire sensor comprising of the signal circuit, the low reference circuit and the 5-volt reference circuit. The engine control module (ECM) supplies 5-volts to the EOP sensor via the 5-volt reference circuit and provides ground via the EOP low reference circuit. The ECM monitors the signal circuit of the EOP sensor to determine the engine oil pressure sensor voltage is within the normal operating range of approximately 1-4 volts. When the engine oil pressure is high, the EOP sensor voltage is high and the ECM senses a high signal voltage. When the engine oil pressure is low, the EOP sensor voltage is low and the ECM senses a low signal voltage. The ECM sends the EOP information to the instrument panel cluster (IPC) via the serial data circuit. The IPC illuminates the engine oil pressure indicator when it receives a serial data message indicating a low engine oil pressure condition.

Conditions for Running the DTC

The engine is running.

Conditions for Setting the DTC

- The ECM detects that the EOP sensor signal circuit is greater than 4.8 volts.
- The above condition is present for greater than 10 seconds.

Action Taken When the DTC Sets

- The ECM records the operating conditions at the time the diagnostics test fails. The ECM displays this information in the Failure Records on the scan tool.
- The IPC illuminates the EOP indicator.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 40 malfunction-free warm-up cycles.

Reference Information

Schematic Reference

- **Instrument Cluster Schematics**

- **Engine Controls Schematics** for the 2.8L, 3.0L, 3.2L, and 3.6L engines
- **Engine Controls Schematics** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines

Connector End View Reference

Component Connector End Views

Description and Operation

- **Instrument Cluster Description and Operation**
- **Engine Control Module Description** for the 2.8L, 3.0L, 3.2L, and 3.6L engines
- **Engine Control Module Description** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the engine oil pressure (EOP) sensor.
2. Ignition OFF, test for less than 1 ohm of resistance between the low reference circuit terminal A and ground.
 - If greater than the specified range, test the low reference circuit terminal A for an open/high resistance. If the circuit tests normal, replace the engine control module (ECM).
3. Ignition ON, test for 4.8-5.2 volts between the 5-volt reference circuit terminal B and the low reference circuit terminal A.
 - If greater than the specified range, test the 5-volt reference circuit terminal B for a short to voltage. If the circuit tests normal, replace the ECM.
4. Install a 3-amp fused jumper wire between the signal circuit terminal C and the low reference circuit terminal A. Verify the scan tool Engine Oil Pressure Sensor parameter is less than 8 kPa (1.2 psi).
 - If greater than the specified range, test the signal circuit terminal C for a short to voltage or an open/high resistance. If the circuit tests normal, replace the ECM.
5. If all circuits test normal, test or replace the EOP sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Engine Oil Pressure Sensor and/or Switch Replacement** for the 2.8L, 3.0L, 3.2L, and 3.6L engines
- **Engine Oil Pressure Sensor and/or Switch Replacement** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines
- **Control Module References** for ECM replacement, setup and programming

SYMPTOMS - DISPLAYS AND GAGES

IMPORTANT: The following steps must be completed before using the symptom diagnostic

tables.

1. Before using the symptom diagnostic tables, perform the **Diagnostic System Check - Vehicle** in order to determine that there are no DTCs set, and that the control modules can communicate via the serial data link.
2. Review the system operation in order to understand the system functions. Refer to the following description and operations:
 - **Instrument Cluster Description and Operation**
 - **Indicator/Warning Message Description and Operation**
 - **Driver Information Center (DIC) Description and Operation**
 - **Audible Warnings Description and Operation**

Visual/Physical Inspection

- Inspect for aftermarket devices which can affect the operation of the instrument panel cluster or the audible warnings system. Refer to **Checking Aftermarket Accessories** .
- Inspect the accessible system components or the visible system components for obvious damage or for obvious conditions which can cause the symptom.
- Inspect for the proper fluid levels.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to **Testing for Intermittent Conditions and Poor Connections** .

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

Gages and Odometer

- **Instrument Cluster Gages Inoperative**
- **Fuel Gage Inaccurate or Inoperative**

Indicators

- **ABS Indicator Malfunction**
- **Air Bag Indicator Circuit Malfunction**
- **Brake Warning Indicator Malfunction**
- **Charge Indicator Malfunction**
- **Door Ajar Indicator Malfunction**
- **Engine Coolant Temperature Indicator Malfunction**
- **Engine Oil Pressure Indicator Always On (3.8L L26 and L32) or Engine Oil Pressure Indicator Always On (All Other Engines)**
- **Hood Ajar Indicator/Message Malfunction**
- **Low Washer Fluid Indicator Malfunction**
- **Malfunction Indicator Lamp (MIL) Diagnosis** for the 3.8L engine
- **Malfunction Indicator Lamp (MIL) Diagnosis** for the 4.8L, 5.3L, 6.0L, 6.2L, and 7.0L engines
- **Seat Belt Indicator Circuit Malfunction - Driver**
- **Seat Belt Indicator Circuit Malfunction - Passenger**
- **Stability System Disabled Indicator Always On**

- **Turn Signal Lamps and/or Indicators Malfunction**
- **Traction Off Indicator Malfunction**
- **Trunk Ajar Indicator Malfunction**

Driver Information Center

- **Driver Information Center (DIC) Inoperative**
- **Driver Information Center (DIC) Switch Inoperative**

Audible Warnings**Chime Malfunction****CHARGE INDICATOR MALFUNCTION****Diagnostic Instructions**

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Circuit/System Description

The engine control module (ECM)/powertrain control module (PCM) uses the generator turn ON signal circuit to control the load of the generator on the engine. A high side driver in the ECM/PCM applies a voltage to the voltage regulator. This signals the voltage regulator to turn the field circuit ON and OFF. The ECM/PCM monitors the state of the generator turn ON signal circuit. The ECM/PCM should detect low voltage on the generator turn on signal circuit when the ignition is ON and the engine is OFF, or when the charging system malfunctions. With the engine running, the ECM/PCM should detect high voltage on the generator turn on signal circuit. The ECM/PCM performs key ON and RUN tests to determine the status of the generator turn on signal circuit. If a malfunction is detected the ECM/PCM will illuminate the charge indicator in the instrument panel cluster (IPC).

Reference Information**Schematic Reference**

- **Instrument Cluster Schematics**
- **Starting and Charging Schematics**

Connector End View Reference**Component Connector End Views****Description and Operation**

- **Instrument Cluster Description and Operation**
- **Charging System Description and Operation**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References

Circuit/System Verification

1. Ignition ON, verify that the charge indicator illuminates during the self test when the ignition is turned ON.
 - If the charge indicator does not illuminate, replace the IPC.
2. Ignition ON, engine running, increase the engine speed to 1,500 RPM.
3. Verify that the scan tool Battery Voltage parameter is between 12.8-15.5 volts for the body control module (BCM), the engine control module (ECM)/powertrain control module (PCM), and the instrument panel cluster (IPC).
 - If all of the Battery Voltage parameters are not within the specified range for all of the modules, refer to **Charging System Test**.
- If the Battery Voltage parameter is not within the specified range for the BCM, refer to Body Control Module Voltage Out Of Range in **Circuit/System Testing**.
- If the Battery Voltage parameter is not within the specified range for the ECM/PCM, refer to Engine Control Module/Powertrain Control Module Voltage Out Of Range in **Circuit/System Testing**.
- If the Battery Voltage parameter is not within the specified range for the IPC, refer to Instrument Panel Cluster Voltage Out Of Range in **Circuit/System Testing**.

Circuit/System Testing

Body Control Module Voltage Out Of Range

1. Ignition OFF, disconnect the harness connectors X1, and X2 at the body control module.
2. Ignition ON, verify that a test lamp illuminates between the following terminals and ground.
 - X1 terminal 46
 - X1 terminal 50
 - X1 terminal 51
 - X1 terminal 52
 - X2 terminal 49
 - If the test lamp does not illuminate, repair the appropriate battery voltage circuit for an open/high resistance.
3. Ignition OFF, test for greater than 1.0 ohm of resistance between the following terminals and ground.
 - X1 terminal 17
 - X1 terminal 19
 - X1 terminal 20
 - X2 terminal 50
 - If less than 1.0 ohm, test the appropriate ground circuit for an open/high resistance.
4. If all circuits test normal, test or replace the BCM.

Engine Control Module/Powertrain Control Module Voltage Out Of Range

1. Ignition OFF, disconnect the harness connectors X1 or X2 at the ECM/PCM.
2. Ignition ON, verify that a test lamp illuminates between the following terminals and ground.
 - X1 terminal 20 (3.8L engine)

- X2 terminal 36 (2.8L, 3.0L, 3.2L, and 3.6L engines)
 - If the test lamp does not illuminate, repair the appropriate battery voltage circuit for an open/high resistance.
- 3. Ignition OFF, test for greater than 1.0 ohm of resistance between the following terminals and ground.
 - X2 terminal 73 (3.8L engine)
 - X2 terminal 58 (2.8L, 3.0L, 3.2L, and 3.6L engines)
 - If less than 1.0 ohm, test the ground circuit for an open/high resistance.
- 4. If all circuits test normal, test or replace the ECM/PCM.

Instrument Panel Cluster Voltage Out Of Range

1. Ignition OFF, disconnect the harness connectors at the instrument panel cluster.
2. Ignition ON, verify that a test lamp illuminates between terminal 12 and ground.
 - If the test lamp does not illuminate, repair the appropriate battery voltage circuit for an open/high resistance.
3. Ignition OFF, test for greater than 1.0 ohm of resistance between terminal 1 and ground.
 - If less than 1.0 ohm, test the ground circuit for an open/high resistance.
4. If all circuits test normal, test or replace the IPC.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for the BCM, ECM/PCM, and IPC replacement, setup, and programming

CHIME MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Circuit/System Description

The radio generates the audible warning through the left speaker. The radio receives audible warning requests via the serial data circuit from the instrument panel cluster (IPC) or the body control module (BCM).

Reference Information

Schematic Reference

- **Instrument Cluster Schematics**
- **Body Control System Schematics**
- **Ignition Lock Schematics**
- **Radio/Navigation System Schematics**

Connector End View Reference

Component Connector End Views

Description and Operation

Audible Warnings Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References

Circuit/System Testing

IMPORTANT: Before performing this diagnostics, make sure no indicator(s) are illuminated after the IPC performs the displays test. If any indicators are illuminated after the bulb test, perform the indicator diagnostics before this diagnostic.

Chime Always On

1. Ignition ON, headlamp switch OFF, verify the scan tool Headlamp Switch parameter is Inactive.
 - If not Inactive, refer to **Headlamps Malfunction** .
2. Ignition ON, park lamp switch OFF, verify the scan tool Park Lamp Switch parameter is Inactive.
 - If not Inactive, refer to **Park, License, and/or Tail Lamps Malfunction** .
3. Ignition ON, close all doors, verify the scan tool Door Ajar Switch parameters are Door Closed.
 - If not Door Closed, refer to **Courtesy Lamps Malfunction** .
4. Ignition OFF, key out of the ignition, verify the scan tool Key In Ignition Status parameter is Key Out.
 - If not Key Out, test the key-in-ignition switch signal circuit terminal 1 for an open or short to voltage. If the circuit tests normal, replace the ignition switch.
5. If all circuits test normal, replace the BCM.

Chime Inoperative

1. Ignition OFF, with key in the ignition, open the driver door. The courtesy lamps should illuminate.
 - If the courtesy lamps do not illuminate, refer to **Courtesy Lamps Malfunction** .
2. Ignition ON, radio ON, adjust the radio balance and fade to the left front speaker.
 - If the speaker does not operate properly, refer to **Speakers Inoperative - One or More** .
3. If the speaker operates properly, replace the radio.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Ignition and Start Switch Replacement**
- **Turn Signal Multifunction Switch Replacement**
- **Control Module References** for the BCM or radio replacement, setup, and programming

DRIVER INFORMATION CENTER (DIC) INOPERATIVE

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Circuit/System Description

The driver information center (DIC) switch is controlled by the IPC. Power and ground is provided to the DIC from the instrument panel cluster. The IPC also provides power to the DIC switch and the DIC switch signal circuit is pulled up to battery voltage in the IPC. The DIC switch input to the DIC is grounded when a switch is activated. The IPC monitors the DIC switch signal circuit to determine the DIC switch inputs.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the IPC.
2. Ignition OFF, test for less than 1 ohm of resistance between the IPC ground circuit terminal 1 and ground.
 - If greater than 1 ohm, test the ground circuit terminal 1 for an open/high resistance.
3. Ignition ON, verify that a test lamp illuminates when connected between the IPC battery positive voltage circuit terminal 12 and ground.
 - If the test lamp does not illuminate, test the battery positive voltage circuit for an open/high resistance.
 - If the circuit tests normal, replace the IPC.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Driver Information Display Switch Replacement**
- **Control Module References** for the IPC replacement, setup and programming

DRIVER INFORMATION CENTER (DIC) SWITCH INOPERATIVE

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Circuit/System Description

The driver information center (DIC) switch is a multiplexed switch. Battery power is provided to the DIC switch via the instrument panel cluster (IPC) with the DIC switch signal circuit pulled up to battery voltage in the IPC. The switch input to the DIC is pulled low or grounded when a switch is activated. The IPC monitors the DIC switch signal circuit to determine the DIC switch inputs. Each switch state-SET/RESET, GAGES, TRIP ODOMETER, VEHICLE INFORMATION, FUEL-corresponds to a certain resistance value.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the DIC.
2. Ignition OFF, test for less than 1 ohm of resistance between the DIC ground circuit and ground.
 - If greater than 1 ohm, test the ground reference circuit for an open/high resistance.
3. Ignition ON, verify all of the scan tool DIC Switch parameters are Inactive.
 - If any are not Inactive, test the signal circuits for a short to ground. If the circuit tests normal, replace the IPC.
4. Ignition ON, install a 3-amp fused jumper wire between the signal circuits and the ground reference circuit terminal 4. Verify all of the scan tool DIC switch parameters are Active.
 - If any are not Active, test the signal circuit for a short to voltage or an open/high resistance. If the circuit tests normal, replace the IPC.
5. If all circuits test normal, test or replace the DIC switch.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Driver Information Display Switch Replacement**
- **Control Module References** for the IPC replacement, setup and programming

ENGINE COOLANT TEMPERATURE INDICATOR MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Circuit/System Description

The instrument panel cluster (IPC) illuminates the engine coolant temperature indicator when the powertrain control module (PCM) determines that the coolant temperature is more than 128°C (262°F). The IPC receives a discrete input from the PCM requesting illumination.

Reference Information

Schematic Reference

Engine Cooling Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Cooling System Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References

Circuit/System Testing

1. Ignition ON, verify that the engine coolant temperature indicator illuminates during the self test when the ignition is turned ON.
 - If the temperature indicator does not illuminate, replace the IPC.
2. Ignition ON, verify that the scan tool Engine Coolant Temperature (ECT) Sensor parameter is within the temperature range shown on the engine coolant temperature gage.
 - If not within the temperature range on the gage, replace the IPC.
3. If the temperature is normal, refer to **Engine Overheating**.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for the IPC replacement, setup, and programming

ENGINE OIL PRESSURE INDICATOR ALWAYS ON (3.8L L26 AND L32)**Diagnostic Instructions**

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Engine Oil Pressure Sensor Signal Circuit	-	P0520	P0520	-
Engine Oil Pressure Sensor Ground Circuit	-	P0520	-	-

Circuit/System Description

The engine oil pressure (EOP) switch is a normally closed switch that opens with the proper oil pressure. With the ignition switch turned ON and the engine not running, the powertrain control module (PCM) should detect a low signal voltage input. With the engine running, the pressure switch opens, and the PCM should detect a high signal voltage input. The PCM tests the state of the EOP signal circuit with the ignition switch turned ON, and the engine turned OFF. The instrument panel cluster (IPC) illuminates the EOP indicator when the IPC receives a serial data message from the PCM requesting the EOP indicator turned ON.

Reference Information**Schematic Reference**

- **Instrument Cluster Schematics**
- **Engine Controls Schematics**

Connector End View Reference**Component Connector End Views****Description and Operation**

- **Instrument Cluster Description and Operation**
- **Powertrain Control Module Description**

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference**Control Module References** for Scan Tool Information**Circuit/System Testing**

IMPORTANT: Do not turn the key to the crank position or engage the starter at any time during diagnosis.

1. Ignition ON, verify the scan tool EOP Switch parameter is Low.
 - o If not Low, replace the IPC.
 2. Ignition OFF, disconnect the EOP switch.
 3. Ignition ON, verify the scan tool Engine Oil Pressure Switch parameter is OK.
 - o If not OK, test the signal circuit terminal A for a short to ground. If the circuit tests normal, replace the ECM.
- If OK, test or replace the EOP switch.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Engine Oil Pressure Sensor and/or Switch Replacement**
- **Control Module References** for the ECM replacement, setup, and programming

ENGINE OIL PRESSURE INDICATOR ALWAYS ON (ALL OTHER ENGINES)

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Circuit/System Description

The engine oil pressure (EOP) sensor changes voltage based on the engine oil pressure. The EOP sensor is a 3-wire sensor comprising of the signal circuit, the low reference circuit and the 5-volt reference circuit. The engine control module (ECM) supplies 5 volts to the EOP sensor via the 5-volt reference circuit and provides ground via the EOP low reference circuit. The ECM monitors the signal circuit of the EOP sensor to determine the EOP sensor voltage is within the normal operating range of approximately 1-4 volts. When the engine oil pressure is high, the EOP sensor voltage is high and the ECM senses a high signal voltage. When the engine oil pressure is low, the EOP sensor voltage is low and the ECM senses a low signal voltage. The ECM sends the EOP data via the serial data circuit to the instrument panel cluster (IPC).

Reference Information

Schematic Reference

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 2.8L, 3.0L, 3.2L and 3.6L engines
- **Engine Controls Schematics** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines

Connector End View Reference

Component Connector End Views

Description and Operation

- **Instrument Cluster Description and Operation**

- **Engine Control Module Description** for the 2.8L, 3.0L, 3.2L and 3.6L engines
- **Engine Control Module Description** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector of the EOP sensor.
2. Ignition OFF, test for less than 1 ohm of resistance between the low reference circuit terminal A and ground.
 - If greater than 1 ohm, test the low reference circuit terminal A for a short to voltage or an open/high resistance. If the circuit tests normal, replace the ECM.
3. Ignition ON, test for 4.8-5.2 volts between the 5-volt reference circuit terminal B and low reference circuit terminal A.
 - If less than 4.8 volts, test the 5-volt reference circuit terminal B for a short to ground or an open/high resistance. If the circuit tests normal, replace the ECM.
 - If greater than 5.2 volts, test the 5-volt reference circuit terminal B for a short to voltage. If the circuit tests normal, replace the ECM.
4. Verify the scan tool Engine Oil Pressure Sensor parameter is greater than 550 kPa (80 psi).
 - If less than 550 kPa (80 psi), test the signal circuit terminal C for a short to ground. If the circuit tests normal replace the ECM.
5. Install a 3-amp fused jumper between the signal circuit terminal C and the low reference circuit terminal A. Verify the scan tool Engine Oil Pressure Sensor parameter is less than 8 kPa (1.2 psi).
 - If greater than 8 kPa (1.2 psi), test the signal circuit terminal C for a short to voltage or an open/high resistance. If the circuit tests normal, replace the ECM.
6. Ignition ON, command the indicators OFF with the scan tool.
 - If the EOP indicator does not turn OFF, replace the IPC.
7. If all circuits test normal, replace the EOP sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Engine Oil Pressure Sensor and/or Switch Replacement** for the 2.8L, 3.0L, 3.2L and 3.6L engines
- **Engine Oil Pressure Sensor and/or Switch Replacement** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines
- **Control Module References** for the ECM or IPC replacement, setup, and programming

FUEL GAGE INACCURATE OR INOPERATIVE

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Fuel Level Sensor Reference Voltage Circuit	P0462	-	-	P0461
Fuel Level Sensor Signal Circuit	P0462	P0463	P0463	P0461
Fuel Level Sensor Low Reference Circuit	-	P0463	P0463	P0461

Circuit/System Description

The fuel level sensor changes resistance in response to the fuel level. The engine control module (ECM)/powertrain control module (PCM) monitors the signal circuit of the fuel level sensor in order to determine the fuel level. When the fuel tank is full, the sensor resistance is low and the ECM/PCM senses a low signal voltage. When the fuel tank is empty, the sensor resistance is high and the ECM/PCM senses a high signal voltage. The ECM/PCM uses the signal circuit of the fuel level sensor in order to calculate the percentage of fuel remaining in the tank. The ECM/PCM sends the fuel information to the instrument panel cluster via the serial data circuit in order to control the fuel gage and display the fuel level.

Reference Information

Schematic Reference

- **Instrument Cluster Schematics**
- **Engine Controls Schematics** for the 2.8L, 3.0L, 3.2L and 3.6L engines
- **Engine Controls Schematics** for the 3.8L engine
- **Engine Controls Schematics** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines

Connector End View Reference

Component Connector End Views

Description and Operation

- **Instrument Cluster Description and Operation**
- **Fuel System Description** for the 2.8L, 3.0L, 3.2L and 3.6L engines
- **Fuel System Description** for the 3.8L engine

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the fuel level sensor.
2. Ignition OFF, test for less than 1 ohm of resistance between the fuel level sensor low reference circuit terminal C and ground.
 - o If greater than the specified range, test the low reference circuit for an open/high resistance. If the circuits tests normal, replace the ECM/PCM.
3. Install a Signal Generator and Instrument Panel Tester between the fuel level sensor signal circuit terminal B and the fuel level sensor low reference circuit terminal C.
4. Ignition ON, vary the signal generator resistance between 40 and 250 ohms. Verify that the scan tool Fuel Tank Level Remaining or Fuel Level parameter displays a range that varies between 5 and 95 percent as the signal generator resistance changes.
 - o If not displaying the specified range, test the signal circuit for an open/high resistance. If the circuit test normal, replace the ECM/PCM.
5. Vary the signal generator resistance between 40 and 250 ohms. Verify that the fuel gage displays a range that varies between empty and full as the signal generator resistance changes.
 - o If the gage is incorrect, replace the IPC.
6. If all circuits test normal, perform the fuel level sensor component test before replacing the fuel level sensor.

Component Testing

1. Ignition OFF, disconnect the harness connector at the fuel level sensor.
2. While sweeping the fuel level sensor through its full range of motion, test for a minimum value of less than 41 ohms and a maximum value greater than 119 ohms of resistance between signal terminal B and the low reference terminal C.
 - o If not within the specified range, replace the fuel level sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Fuel Level Sensor Replacement** for the 2.8L, 3.0L, 3.2L and 3.6L engines
- **Fuel Level Sensor Replacement** for the 3.8L engine
- **Fuel Level Sensor Replacement** for the 4.8L, 5.3L, 6.0L, 6.2L and 7.0L engines
- **Control Module References** for the ECM/PCM and IPC replacement, setup and programming

INSTRUMENT CLUSTER GAGES INOPERATIVE**Diagnostic Instructions**

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Circuit/System Description

This diagnostic procedure applies to serial data gages located in the instrument panel cluster (IPC) which include the speedometer, tachometer, engine coolant temperature gage and volt gage if equipped.

Reference Information**Schematic Reference**

Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**
- **Lifting and Jacking the Vehicle**

Scan Tool Reference

Control Module References for Scan Tool Information

Circuit/System Verification

IMPORTANT: If the suspect gage is the speedometer, the drive wheels of the vehicle must be raised and the transmission must be placed in drive or first gear.

1. Ignition ON, with the scan tool, perform the IPC Gage Sweep Test in the IPC Output Controls. Verify that all gage dials move from minimum to the maximum position and back to the gage minimum position.
 - o If the gage does not perform the IPC Gage Sweep Test, replace the IPC.
2. Start the engine, with the vehicle drive wheels raised and place the transmission in drive or first gear. Verify that the speedometer value matches the scan tool Vehicle Speed parameter in the engine control module (ECM)/powertrain control module (PCM) Engine Data List.
 - o If the speedometer is incorrect, test or replace the IPC.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for the IPC replacement, setup and programming

REPAIR INSTRUCTIONS

AMBIENT AIR TEMPERATURE GAGE SENSOR REPLACEMENT

Removal Procedure

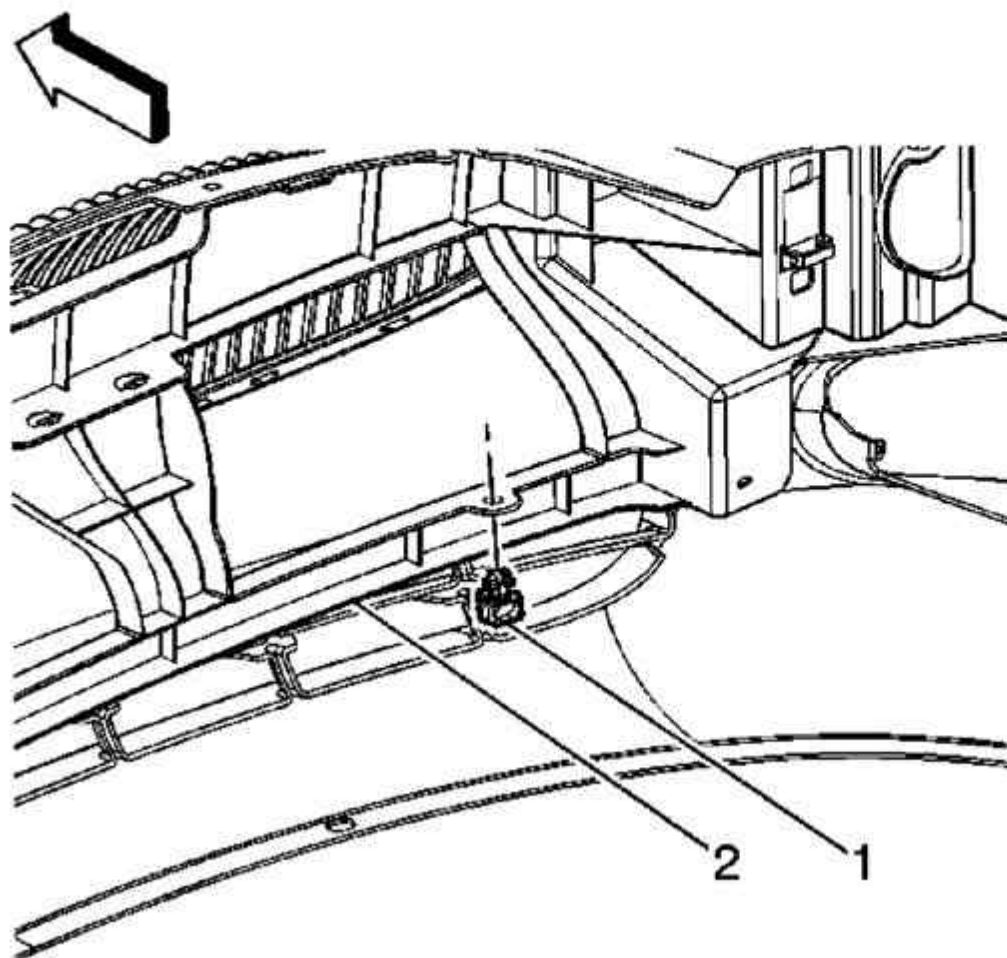


Fig. 8: Identifying Ambient Air Temperature Gage Sensor
Courtesy of GENERAL MOTORS CORP.

1. Remove the radiator sight shield. Refer to **Radiator Support Sight Shield Replacement**.
2. Disconnect the electrical connector from the ambient air temperature sensor (1).
3. Release the tabs on the sensor and remove the ambient air temperature sensor (1) from the front fascia (2).

Installation Procedure

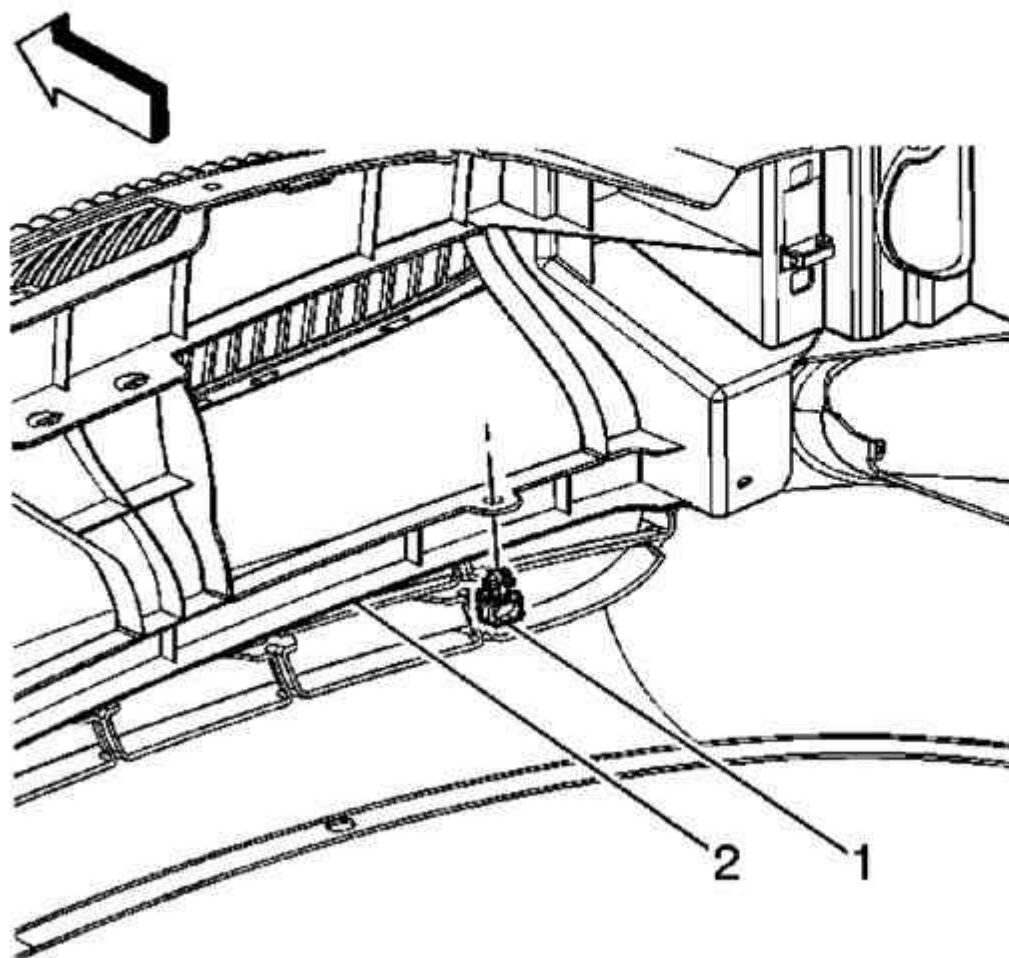


Fig. 9: Identifying Ambient Air Temperature Gage Sensor
Courtesy of GENERAL MOTORS CORP.

1. Connect the electrical connector to the ambient air temperature sensor (1).
2. Install the ambient temperature sensor (1) to the front fascia (2).
3. Install the radiator sight shield. Refer to **Radiator Support Sight Shield Replacement**.

ELECTRONIC COMPASS CALIBRATION

Compass Magnetic Variation Adjustment

Magnetic variation adjustments are required when the compass displays a constant error in heading. Variation is the difference between magnetic north and true north due to geographical location.

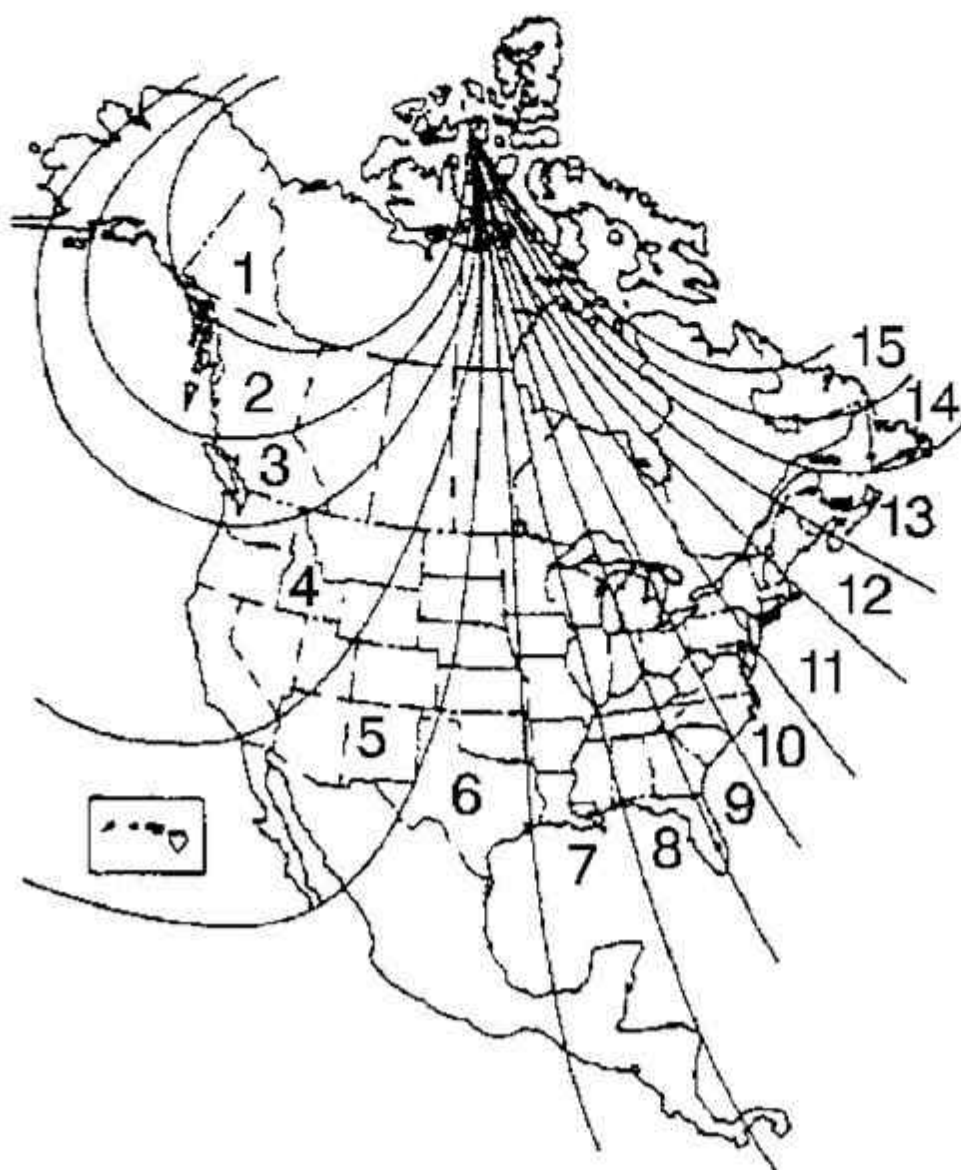


Fig. 10: Illustrating Magnetic Variation Zones
Courtesy of GENERAL MOTORS CORP.

1. Turn ON the ignition, with the engine OFF.
2. Press the vehicle information button until - PRESS SET/RESET TO CHANGE COMPASS ZONE - is displayed on the DIC.
3. Locate your vehicle's current location and variance zone number on the map. Zones 1 through 15 are available.
4. Scroll through and select the appropriate variance zone using the set/reset button. To view the direction the vehicle is moving, navigate to one of the trip/fuel menu screens using the DIC fuel information button and the direction will be shown at the right top corner of the DIC display.

If the compass needs to be calibrated, use the compass calibration procedure below.

Compass Calibration

Before calibrating the compass, drive the vehicle to an area that is magnetically clean (free of large metallic objects). Only calibrate the compass in a safe location where driving the vehicle in circles is not a problem.

1. With the ignition ON, press the vehicle information button until - PRESS SET/RESET TO CALIBRATE COMPASS - is displayed in the DIC
2. Press the set/reset button in order to start compass calibration.
3. The DIC should display - CALIBRATING BEGUN DRIVE IN CIRCLES.
4. Drive the vehicle in circles at a speed of less than mph 8 km/h (5 mph) until calibration is complete. The DIC will display - CALIBRATION COMPLETE - when the calibration is complete.

ELECTRONIC COMPASS MODULE REPLACEMENT

Removal Procedure

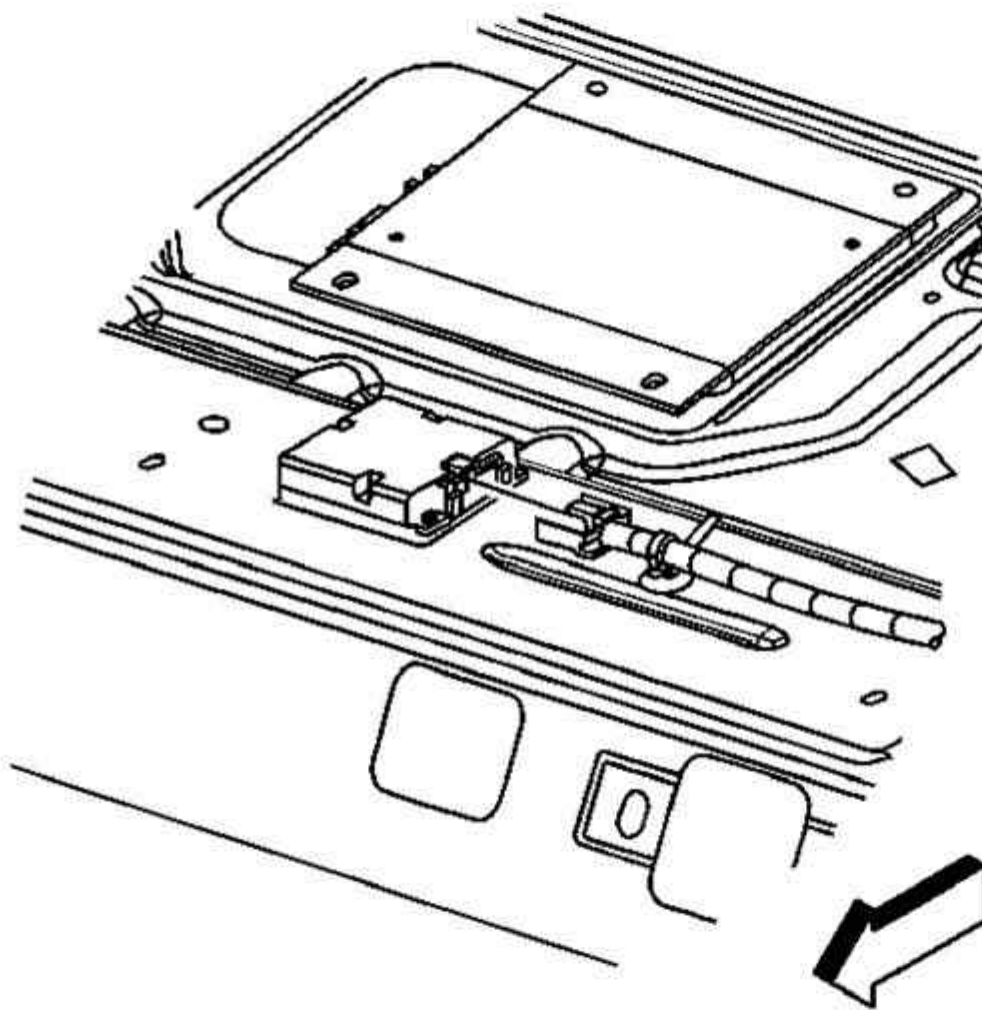


Fig. 11: Identifying Electronic Compass
Courtesy of GENERAL MOTORS CORP.

1. Remove the rear shelf trim panel. Refer to **Rear Window Shelf Trim Panel Replacement**.
2. Reposition the sound barrier for access.
3. Disengage the electronic compass retainers.
4. Disconnect the electrical connector.
5. Remove the electronic compass.

Installation Procedure

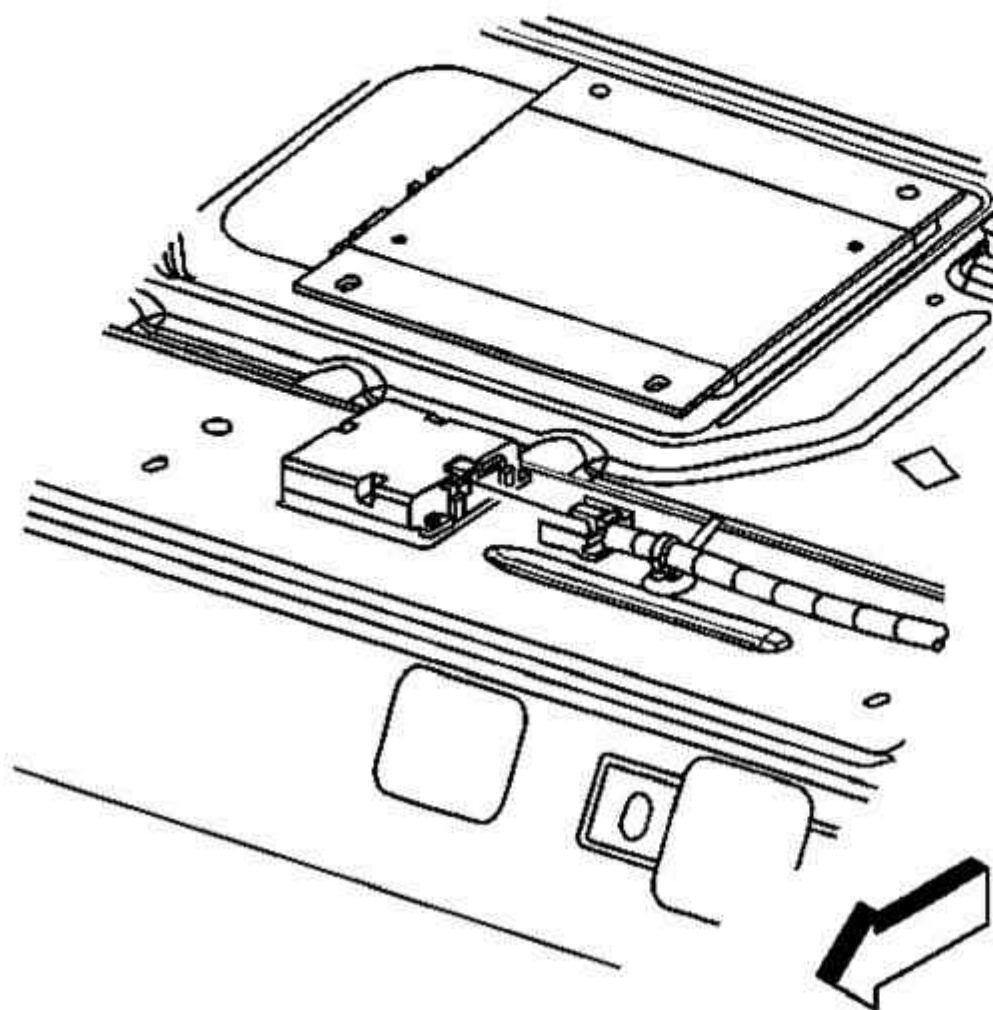


Fig. 12: Identifying Electronic Compass
Courtesy of GENERAL MOTORS CORP.

1. Connect the electrical connector.
2. Align the electronic compass to the openings in the rear shelf. Install the electronic compass.
3. Install the sound barrier.
4. Install the rear shelf trim panel. Refer to **Rear Window Shelf Trim Panel Replacement**.

DRIVER INFORMATION DISPLAY SWITCH REPLACEMENT

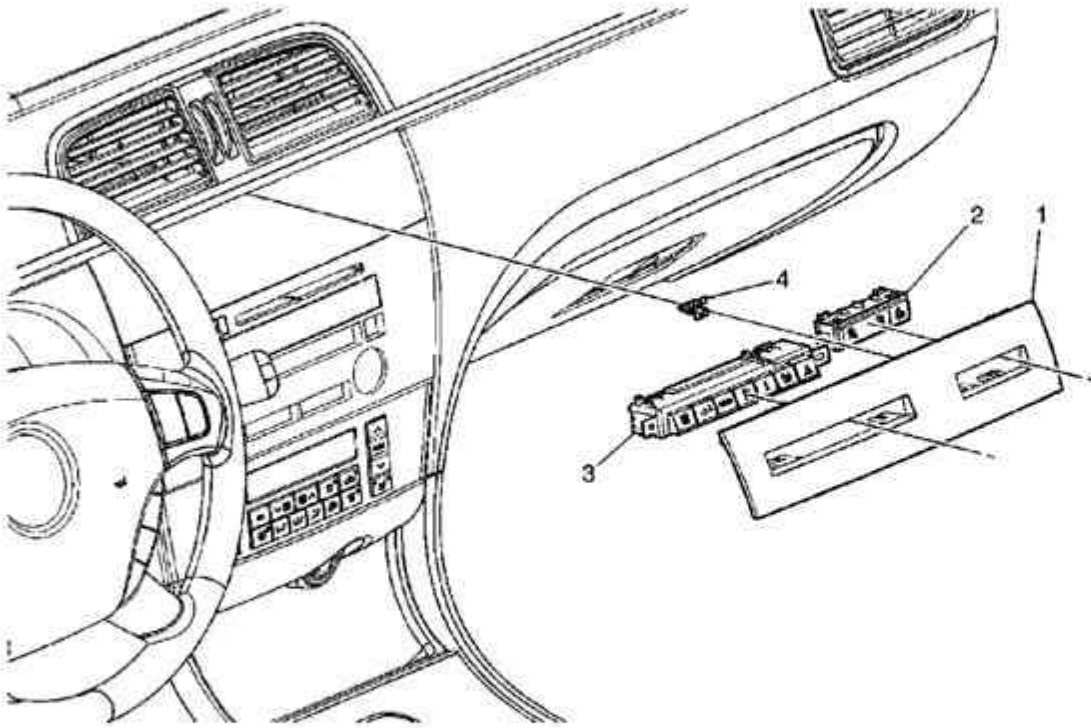


Fig. 13: Identifying Driver Information Center Switch
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Fastener Tightening Specifications: Refer to <u>Fastener Tightening Specifications</u> .	
1	Bezel, Driver Information Display Tip: Pull the bezel away from the instrument panel far enough to disconnect the electrical connectors, then remove the bezel from the vehicle.
2	Indicator Assembly, Inflatable Restraint
3	Switch Assembly, Driver Information Display
4	Clip, Driver Information Display Bezel

INSTRUMENT CLUSTER REPLACEMENT

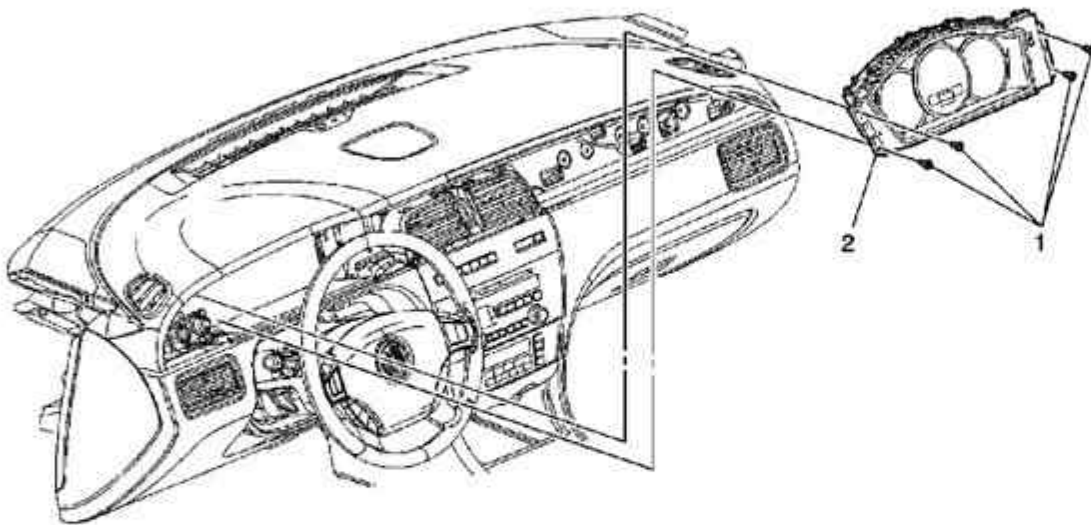


Fig. 14: Identifying Instrument Panel Cluster (IPC)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure:	

Remove the instrument panel cluster trim plate. Refer to **Instrument Panel Cluster Trim Plate Bezel Replacement**.

1	Instrument Panel Cluster Screw (Qty: 4) NOTE: Refer to <u>Fastener Notice</u>. Tighten: 2 N.m (18 lb in)
2	Instrument Panel Cluster Assembly Refer to <u>Control Module References</u> for programming and setup information.

DESCRIPTION AND OPERATION

AUDIBLE WARNINGS DESCRIPTION AND OPERATION

Audible warnings alert the driver of a system concern or a critical vehicle condition. The radio or the chime module (export) generates the audible warnings. If the radio or chime module receives multiple audible warning requests, the warning with the highest priority sounds first. The following lists the audible warning priority and the pulse rate:

1. Fast rate chime (180 pulses per minute)
2. Medium rate chime (120 pulses per minute)
3. Slow rate chime (60 pulses per minute)
4. Single chime

DIC Reminder

The DIC reminder is intended to attract the drivers attention to the DIC for a warning message. Refer to **Driver Information Center (DIC) Description and Operation**.

Fasten Safety Belt Warning

The BCM activates the fasten safety belt audible warning as determined by the seat belt switch. The BCM receives a discrete input from the seat belt switch. The fasten safety belt warning sounds and the fasten safety belt indicator displays when the following occurs:

- The ignition switch transitions to ON.
- The BCM detects that the drivers seat belt is not buckled (signal is low).

If the seat belt is buckled when the ignition is turned on, the chime does not sound. If the seat belt is buckled while the chime is sounding, the chime stops. If the seat belt is unbuckled after the initial transition to ON, the chime does not sound.

Key-In-Ignition Warning

The BCM activates the key-in-ignition audible warning as determined by the ignition key alarm switch. The key-in-ignition warning sounds when the following occurs:

- The ignition switch is OFF.
- The body control module (BCM) determines that the drivers door is open (signal is low).
- The BCM determines that the key-in-ignition switch is closed (signal is low).

Lights On Warning

The BCM activates the lights on warning as requested by the headlamp dimmer switch. The lights on warning sounds when the following occurs:

- The key is out of the ignition.
- The BCM determines that the drivers door is open (signal is low).
- The BCM determines that the headlamp switch is in the park or head position.

Turn Signal Reminder

The BCM activates the turn signal warning as requested by either turn signal switch. The turn signal warning sounds when the following occurs:

- The ignition is in RUN.
- The turn signal switch is in either turn position, sensing, within 1 second, an open to B+ transition in the turn signal control circuit (left or right turn).
- The vehicle has traveled a distance of 1.2 km (0.75 mi) by counting pulses on the vehicle speed input circuit.

The BCM turns off the turn signal reminder when either the ignition switch is turned to the OFF position or the turn signal switch returns to the OFF position.

DRIVER INFORMATION CENTER (DIC) DESCRIPTION AND OPERATION

The instrument panel cluster is equipped with a driver information center (DIC) that displays several vehicle and driver warning messages, gage information, fuel information and season/trip odometer information. The DIC also contains the Information button, which is used in programming the Personalization features. The DIC is equipped with the following five momentary push type switches for scrolling through the various DIC selections:

- Trip Odometer Button
- Vehicle Information Button
- Fuel Button
- Gage Button
- Set/Reset Button

Warning Messages

The DIC displays several vehicle and driver warning messages. These warning messages alert the driver to a certain vehicle condition or problem that requires his prompt attention. Some DIC warning messages are accompanied by audible chime warnings to call the drivers attention to the message that is displayed in the DIC. The messages are displayed according to their level of priority. The following messages may be displayed:

- A/C Off For Engine Protection
- Brake Fluid Low
- Battery Saver Active
- Change Oil Soon
- Charging System Failure
- Check Gas Cap
- Delayed Locking
- Cruise Set XXX MPH
- Delayed Locking
- Door Ajar - Driver, Left Rear, Front Passenger and Right Rear
- Engine Coolant Hot

- Headlamps Suggested
- Hood Ajar
- Hot Trans Fluid
- Key Fob Battery Low
- Key In Ignition Reminder
- Left Front Turn Lamp Out
- Left Rear Turn Lamp Out
- Low Coolant
- Low Fuel
- Low Oil Pressure
- Low Washer Fluid
- Park Brake On
- Park lamps On
- Reading Lamp On
- Reduce Engine Power
- Reduced Power Stop When Safe
- Remote Start Disabled
- Remote Start Failed (Service Remote Start)
- Right Front Turn Lamp Out
- Right Rear Turn Lamp Out
- Service ABS System
- Service Brake System
- Service Park lamps
- Service Vehicle Soon
- Service Theft System
- Service Stability System
- Service Steering Module
- Service Traction System
- Stability Control System Active
- Stability Control Off
- Starting Disabled (Due To Electronic Throttle Control)
- Starting Disabled (Due To Theft System)
- Traction System Active
- Traction System Off
- Theft System Not Programmed
- Trunk Open
- Turn Signal On

For more information on the DIC warning messages refer to **Indicator/Warning Message Description and Operation**.

Trip Odometer Button

The trip odometer button is used to access the Odometer, Trip Distance A and B. Average Speed and Time Elapsed modes are also available in the uplevel DIC.

Odometer

The odometer is capable of displaying values from 0 to 999,999 miles or kilometers. If the ignition is in the OFF or ACC position, the odometer can be displayed by pressing the trip button. The odometer will remain displayed for 5 seconds. If the ignition is in the OFF position, the odometer will also be displayed for 15 seconds.

Trip Odometer A and B

The DIC can display Trip A or Trip B odometers. The trip odometers are capable of displaying values from 0 to 99999.9 miles or kilometers. When the maximum value of 99999.9 miles or kilometers is reached, the trip odometer will roll over to 0.0 miles or kilometers. To reset the trip odometer, press the Set/Reset button. If the Set/Reset button is held for three seconds, it will perform a retro-active reset. This feature is used to display the total number of miles accumulated on a trip since the last ignition cycle.

Average Vehicle Speed (AVS)

The DIC displays the average speed of the vehicle in mph or km/h. The average speed displayed is the cumulative average of the vehicle speed since the last reset.

Elapsed Time

The timer is displayed as XX (hours) : XX (minutes) : XX (seconds). The timer status and data value is retained in memory when the ignition is turned OFF. When the ignition is ON again, the timer status and data value is resumed. The timer maximum value is 99:59:59. When the maximum is reached, the timer rolls over to 00:00:00 and continues. The timer can start, stop, and continue by pressing Set/Reset. The Set/Reset button is pressed and held for three seconds to reset the timer to zero.

Vehicle Information Button

The options button is used to access the Personalization mode in the DIC. It will also access the Date, Language, Display Units, Daytime Display Enhancements, Engine Oil Monitor System, Tire Inflation Monitor System, and Compass Calibration modes (uplevel only).

Language Selection

The language of the DIC can set to English, French, or Spanish by pressing the Set/Reset button. Once the preferred language is chosen, the options button is pressed to move to the next mode.

English/Metric Unit Selection

The units of the DIC and other vehicle displays can be set to English or Metric by pressing the DIC Set/Reset button. Once the preferred units are chosen, the options button is pressed to move to the next mode.

Compass Re-Calibration/Compass Zone Selection

The DIC compass is self-calibrating. However, the compass may need to be recalibrated once it travels outside a specific geographic zone. For compass calibrations and zones refer to: **Electronic Compass Calibration**.

Customization and Personalization Programming Options

The DIC will customize a number of driver preferences. For complete details on Personalization: Refer to the Owner's Manual for more information.

Set/Reset Button

This button is used to set or reset values within the trip odometer, average economy or options mode. Refer to the descriptions to find out which items can be reset.

Gages Button (Uplevel DIC)

This button is used to access the Oil Life Remaining, Transmission Fluid Temp, Battery, Engine Hours, and Engine Boost (with supercharger) modes.

Oil Life Index (OLI) and Reset

The Engine Oil Life Remaining mode will indicate the percentage of remaining oil life before the driver is alerted to change the oil. The PCM/ECM will transmit the class 2 message to display the CHANGE OIL SOON warning in the DIC once the remaining oil life falls below five percent. Once the oil has been changed, the engine oil life monitor needs to be reset.

Battery Voltage

The DIC displays the current voltage as communicated by the body control module (BCM).

Tire Pressure Monitor System Reset

Allows the reset of the Tire Inflation Monitor System on ABS equipped vehicles once air pressure within the tires has been changed.

Fuel (Uplevel DIC)

This button is used to access the Average Fuel Economy (AFE), Instantaneous Fuel Economy (IFE), and the Fuel Range modes.

Average Fuel Economy (AFE)

The DIC displays the average miles per gallon or average liters per 100 km/h. Average Fuel Economy (AFE) is resettable with the Set/Reset button and is calculated as the ratio between the following values:

- $AFE = \text{Distance} / \text{Fuel}$
- Distance = The accumulated distance since the last AFE reset
- Fuel = The accumulated fuel consumption since the last AFE reset

Instantaneous Fuel Economy (IFE)

The DIC will display the instant fuel economy under the current driving conditions and will change as driving conditions change.

Fuel Range

The Fuel Range indicates the distance that the vehicle can travel under current fuel economy and fuel level conditions. It is calculated from cumulative fuel usage, fuel remaining, and odometer information. Fuel Range is not a resettable parameter. If the fuel tank contains less than 2 gallons (7.6 L) the DIC will display the low fuel message.

Ambient Air Temperature

The ambient air temperature is displayed in the driver information center (DIC) by the instrument panel cluster (IPC). The IPC displays the ambient air temperature in Fahrenheit or Celsius. The ambient air temperature sensor is interfaced with the IPC via two discreet circuits: the ambient air temperature sensor signal circuit and the low reference circuit. The instrument panel cluster (IPC) monitors the signal circuit of the ambient air temperature sensor. The ambient air temperature sensor is a thermistor which varies in resistance as the ambient temperature changes. As the resistance of the ambient air temperature sensor increases, the IPC senses a larger voltage drop across the sensor, indicating a lower temperature. As the resistance of the ambient air temperature sensor decreases, the IPC senses a smaller voltage drop across the sensor, indicating a higher temperature. The DIC displays "SC" when the ambient air temperature is shorted to ground and displays "OC" when an open circuit exists. When the ambient air temperature is at or below 37°F (3°C), the "ICE" warning message is intermittently displayed in the

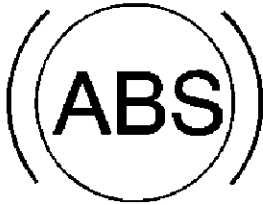
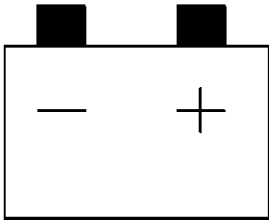
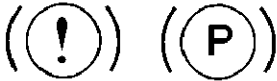
DIC for approximately 2 minutes.

Compass

The instrument panel cluster (IPC) displays the vehicle compass heading in the driver information center (DIC). The internal fault detection of the electronic compass module is handled by the instrument panel cluster (IPC). The compass information is sent to the IPC via 2 discreet inputs from the external electronic compass module. The DIC displays 2 dashes (- -) when the IPC loses connection with the electronic compass module. For compass calibrations and zones refer to: [Electronic Compass Calibration](#).

INDICATOR/WARNING MESSAGE DESCRIPTION AND OPERATION

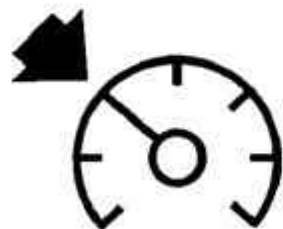
Indicators

Symbol	Reference
	Refer to ABS Description and Operation
	Refer to SIR System Description and Operation
 BATTERY	Refer to Charging System Description and Operation
 BRAKE	Refer to Brake Warning System Description and Operation
	Refer to Fuel System Description for the 2.8L,

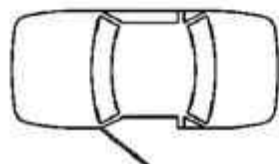


CHECK GAS CAP

3.0L, 3.2L, and 3.6L engines or **Fuel System Description** for the 3.8L engine



Refer to **Cruise Control Description and Operation**



Refer to **Door Ajar Indicator Description and Operation**



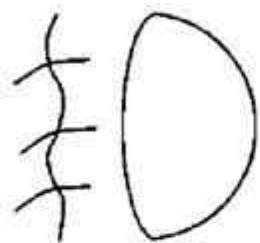
Refer to **Cooling System Description and Operation**



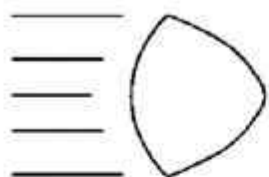
Refer to **Seat Belt System Description and Operation**

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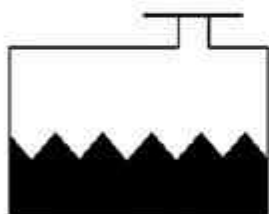
Refer to **Exterior Lighting Systems Description and Operation**

Refer to Indicator/Warning Message Description and Operation

Refer to **Exterior Lighting Systems Description and Operation**Refer to **Exterior Lighting Systems Description and Operation**

km/h

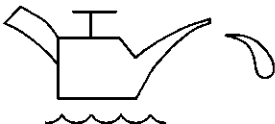
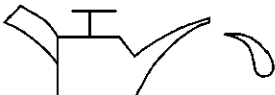
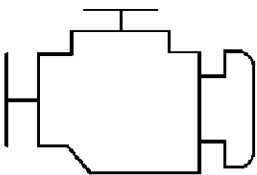
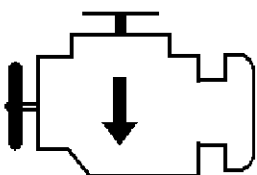
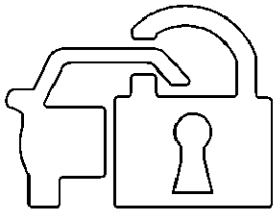
Refer to Indicator/Warning Message Description and Operation

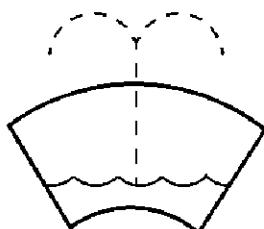
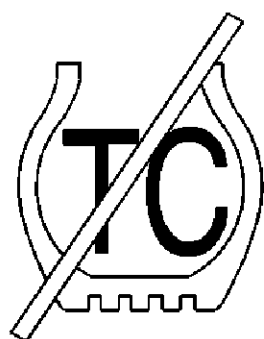
Refer to **Cooling System Description and Operation**

Refer to Indicator/Warning Message Description and Operation

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	Refer to Indicator/Warning Message Description and Operation
	Malfunction Indicator Lamp: Refer to <u>Engine Control Module Description</u> for the 2.8L, 3.0L, 3.2L, and 3.6L engines or <u>Powertrain Control Module Description</u> for the 3.8L engine or <u>Engine Control Module Description</u> for the 4.8L, 5.3L, 6.0L, 6.2L, and 7.0L engines
MPH	Refer to Indicator/Warning Message Description and Operation
	Malfunction Indicator Lamp: Refer to <u>Throttle Actuator Control (TAC) System Description</u> for the 2.8L, 3.0L, 3.2L, and 3.6L engines or <u>Throttle Actuator Control (TAC) System Description</u> for the 3.8L engine or <u>Throttle Actuator Control (TAC) System Description</u> for the 4.8L, 5.3L, 6.0L, 6.2L, and 7.0L engines
	Refer to <u>Content Theft Deterrent (CTD) Description and Operation</u>
	Service Vehicle Soon: Refer to Indicator/Warning Message Description and Operation
	Tire Pressure Low: Refer to <u>Tire Pressure Monitor Description and Operation</u>



Traction Control/Stability Control: Refer to **ABS Description and Operation**

Turn Signals: Refer to **Exterior Lighting Systems Description and Operation**

Washer Fluid Level Low: Refer to **Wiper/Washer System Description and Operation**

DIC Warning Messages

Message	Reference
A/C Off For Engine Protection	Refer to <u>Cooling System Description and Operation</u>
Brake Fluid Low	Refer to <u>Brake Warning System Description and Operation</u>
Battery Saver Active	Refer to <u>Charging System Description and Operation</u>
Charging System/Generator Fault	Refer to <u>Charging System Description and Operation</u>
Check Gas Cap	Refer to <u>Fuel System Description</u> for the 2.8L, 3.0L, 3.2L, and 3.6L engines or <u>Fuel System Description</u> for the 3.8L engine

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Delayed Locking	Refer to <u>Power Door Locks Description and Operation</u>
Door Ajar - Driver	Refer to <u>Door Ajar Indicator Description and Operation</u>
Door Ajar-Left Rear	Refer to <u>Door Ajar Indicator Description and Operation</u>
Door Ajar - Passenger	Refer to <u>Door Ajar Indicator Description and Operation</u>
Door Ajar - Right Rear	Refer to <u>Door Ajar Indicator Description and Operation</u>
Engine Coolant Hot	Refer to <u>Cooling System Description and Operation</u>
Engine Oil Change Soon (Change Oil Soon)	Refer to Indicator/Warning Message Description and Operation
Headlamps Suggested	Refer to <u>Exterior Lighting Systems Description and Operation</u>
Hood Ajar	Refer to <u>Content Theft Deterrent (CTD) Description and Operation</u>
Hot Trans Fluid	Refer to <u>Electronic Component Description</u>
Key Fob Battery Low	Refer to <u>Keyless Entry System Description and Operation</u>
Key In Ignition Reminder	Refer to <u>Steering Wheel and Column Description and Operation</u>
Left Front Turn Lamp Out	Refer to <u>Exterior Lighting Systems Description and Operation</u>
Left Rear Turn Lamp Out	Refer to <u>Exterior Lighting Systems Description and Operation</u>
Low Coolant	Refer to <u>Cooling System Description and Operation</u>
Low Fuel	Refer to Indicator/Warning Message Description and Operation
Low Oil Level	Refer to Indicator/Warning Message Description and Operation
Low Oil Pressure	Refer to Indicator/Warning Message Description and Operation
Low Washer Fluid	Refer to <u>Wiper/Washer System Description and Operation</u>
Park Break On	Refer to <u>Park Brake System Description and Operation</u>
Park Lamps On	Refer to <u>Exterior Lighting Systems Description and Operation</u>
Reading Lamp On	Refer to <u>Interior Lighting Systems Description and Operation</u>
Reduced Engine Power	Malfunction Indicator Lamp: Refer to <u>Throttle Actuator Control (TAC) System Description</u> for the 2.8L, 3.0L, 3.2L, and 3.6L engines or <u>Throttle Actuator Control (TAC) System Description</u> for the 3.8L engine or <u>Throttle Actuator Control (TAC) System Description</u> for the 4.8L, 5.3L,

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	6.0L, 6.2L, and 7.0L engines
Reduced Power Stop When Safe	Malfunction Indicator Lamp: Refer to <u>Throttle Actuator Control (TAC) System Description</u> for the 2.8L, 3.0L, 3.2L, and 3.6L engines or <u>Throttle Actuator Control (TAC) System Description</u> for the 3.8L engine or <u>Throttle Actuator Control (TAC) System Description</u> for the 4.8L, 5.3L, 6.0L, 6.2L, and 7.0L engines
Remote Start Disabled	Refer to <u>Keyless Entry System Description and Operation</u>
Remote Start Failed (Service Remote Start)	Refer to <u>Keyless Entry System Description and Operation</u>
Right Front Turn Lamp Out	Refer to <u>Exterior Lighting Systems Description and Operation</u>
Right Rear Turn Lamp Out	Refer to <u>Exterior Lighting Systems Description and Operation</u>
Service ABS System	Refer to <u>ABS Description and Operation</u>
Service Brake System	Refer to <u>Brake Warning System Description and Operation</u>
Service Park Lamps	Refer to <u>Exterior Lighting Systems Description and Operation</u>
Service Vehicle Soon	Refer to Indicator/Warning Message Description and Operation
Service Theft System	Refer to <u>Content Theft Deterrent (CTD) Description and Operation</u>
Service Stability System	Refer to <u>ABS Description and Operation</u>
Service Steering Module	Refer to <u>Variable Effort Steering System Description and Operation</u>
Service Traction System	Refer to <u>ABS Description and Operation</u>
Stability Control System Active	Refer to <u>ABS Description and Operation</u>
Stability Control Off	Refer to <u>ABS Description and Operation</u>
Starting Disabled (Due To Theft System)	Refer to <u>Content Theft Deterrent (CTD) Description and Operation</u>
Starting Disabled (Due To Electronic Throttle Control)	Refer to <u>Throttle Actuator Control (TAC) System Description</u>
Traction System Active	Refer to <u>ABS Description and Operation</u>
Traction System Off	Refer to <u>ABS Description and Operation</u>
Theft System Not Programmed	Refer to <u>Content Theft Deterrent (CTD) Description and Operation</u>
Trunk Open	Refer to <u>Door Ajar Indicator Description and Operation</u>
Turn Signal On	Refer to <u>Exterior Lighting Systems Description and Operation</u>
Washer Fluid Low	Washer Fluid Level Low: Refer to <u>Wiper/Washer System Description and Operation</u>

CHANGE OIL SOON

The instrument panel cluster (IPC) displays the CHANGE OIL SOON message in the DIC when the PCM/ECM

determines that the engine oil life is less than 5 percent. The PCM/ECM sends a serial data message to the IPC requesting the display of the change oil soon message in the DIC. After the oil is changed, reset the engine oil monitor. Refer to **Driver Information Center (DIC) Description and Operation** and to **GM Oil Life System Resetting**.

KM/H

The instrument panel cluster (IPC) displays the km/h indicator when the Metric mode is selected in the IPC (if equipped with the base IPC U2E) or selected from the DIC information switch (if equipped with uplevel IPC UH8).

Fuel Level Low Indicator

The instrument panel cluster (IPC) displays the fuel level low indicator when the IPC receives a serial data message from the ECM/PCM indicating a low fuel condition.

LOW FUEL

The instrument panel cluster (IPC) displays the LOW FUEL message in the DIC when the IPC receives a serial data message from the PCM/ECM indicating a low fuel condition (if equipped with uplevel IPC UH8).

Low Oil Level

The instrument panel cluster (IPC) displays the low oil level indicator when the PCM/ECM detects the engine oil level is low. The PCM/ECM monitors the signal circuit of the engine oil level switch to determine the oil level. The IPC receives a serial data message from the PCM/ECM requesting display of the indicator in the IPC.

LOW OIL LEVEL

The instrument panel cluster (IPC) displays the LOW OIL LEVEL message in the DIC when the PCM/ECM detects a low engine oil level condition. The PCM/ECM monitors the signal circuit of the engine oil level switch to determine the oil level. The IPC receives a serial data message from the PCM/ECM requesting display of the LOW OIL LEVEL message in the DIC (if equipped with uplevel IPC UH8).

Low Oil Pressure

The instrument panel cluster (IPC) displays the low oil pressure indicator when the PCM/ECM detects a low engine oil pressure condition. The IPC receives a serial data message from the PCM/ECM requesting the display of the low oil pressure indicator.

LOW OIL PRESSURE

The instrument panel cluster (IPC) displays the LOW OIL PRESSURE message in the DIC when the PCM/ECM detects a low engine oil pressure condition. The IPC receives a serial data message from the PCM/ECM requesting the display of the LOW OIL PRESSURE message in the DIC (if equipped with uplevel IPC UH8).

MPH

The instrument panel cluster (IPC) displays the MPH indicator when the English mode is selected in the IPC (if equipped with the base IPC U2E) or selected from the DIC information switch (if equipped with uplevel IPC UH8).

Rear Compartment Lid Release

The rear compartment lid can be released by depressing the rear compartment release button in the glove box or holding either front power door lock switch to the unlock position for a minimum of 2 seconds or by pressing the rear compartment release button on the key fob. The transmission must be in the PARK position for the rear compartment to release.

Service Vehicle Soon

The instrument panel cluster displays the service vehicle soon indicator when the PCM/ECM or BCM detects certain vehicle malfunctions that are not related to the emissions system. The IPC receives a serial data message from the PCM/ECM or BCM requesting display of the Service Vehicle Soon indicator.

SERVICE VEHICLE SOON

The instrument panel cluster displays the SERVICE VEHICLE SOON message in the DIC when the PCM/ECM or BCM detects certain vehicle malfunctions that are not related to the emissions system. The IPC receives a serial data message from the PCM/ECM or BCM requesting the display of SERVICE VEHICLE SOON message in the DIC (if equipped with uplevel IPC UH8).

INSTRUMENT CLUSTER DESCRIPTION AND OPERATION**Displays Test**

Certain instrument panel cluster (IPC) features are tested when the ignition is turned on in order to verify the features are working properly. The following occurs at key up:

- Air Bag indicator illuminates seven times.
- ABS indicator illuminates briefly.
- BRAKE indicator illuminates briefly.
- Charging System indicator illuminates.
- Gages WOW.
- Check Gas cap indicator illuminates briefly.
- Coolant Temperature indicator illuminates briefly.
- Cruise Engaged indicator illuminates briefly.
- Door Ajar indicator illuminates briefly.
- Low Fuel indicator illuminates briefly.
- Headlamp Suggested indicator illuminates briefly.
- Low Oil Level/Change Oil indicator illuminates briefly.
- Oil Pressure indicator illuminates briefly.
- Reduced Engine Power indicator illuminates briefly.
- Security indicator illuminates briefly.
- Service Vehicle Soon illuminates briefly.
- Service Engine Soon indicator (MIL) illuminates briefly.
- Service Traction Control indicator illuminates.
- Tire Pressure Monitoring indicator illuminates briefly.
- Trunk Open indicator illuminates briefly.
- Washer Fluid Level indicator illuminates briefly.

Indicators and Warning Messages

Refer to **Indicator/Warning Message Description and Operation**.

Engine Coolant Temperature Gage

The instrument panel cluster (IPC) displays the engine coolant temperature as determined by the powertrain control module (PCM)/engine control module (ECM). The IPC receives a serial data message from the PCM/ECM indicating the engine coolant temperature. The engine coolant temperature gage defaults to 32°C (89.6°F) if there

is a malfunction in the engine coolant temperature sensor or the IPC detects a loss of serial data communication with the PCM/ECM.

Fuel Gage

The instrument panel cluster (IPC) displays the fuel level as determined by the PCM/ECM. The IPC receives a serial data message from the PCM/ECM indicating the fuel tank level remaining. The fuel gage defaults to empty if the PCM/ECM detects a malfunction in the fuel level sensor circuit or the IPC detects a loss of serial data communication with the PCM/ECM.

When the fuel level is below a pre-determined value, the low fuel indicator/message is displayed in the IPC.

Speedometer

The instrument panel cluster (IPC) displays the vehicle speed based on serial data message from the PCM/ECM. The speedometer defaults to 0 mph (0 km/h) if the IPC detects a loss of serial data communication with the PCM/ECM.

Tachometer

The instrument panel cluster (IPC) displays the engine speed based on serial data message from the PCM/ECM. The tachometer defaults to 0 rpm if the IPC detects a loss of serial data communication with the PCM/ECM.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/ Description
	J-33431-C Signal Generator and Instrument Panel Tester

2008 Buick LaCrosse CXL
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